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Comm 62.1700 Structural tests and special inspections. The requirements in IBC chapter 17, except for the requirements in IBC section 1715, are not included as part of this code.

Comm 62.1802 Foundation and soil investigation. (1) GENERAL. Substitute the following wording for the requirements in IBC section 1802.1: Foundation and soils investigations shall be conducted in conformance with IBC sections 1802.2 through 1802.6.

(2) WHERE REQUIRED. Substitute the following wording for the requirements, but not the exception, in IBC section 1802.2: The owner or applicant shall make a foundation and soils investigation available to the building official, upon request, where required in IBC sections 1802.2.1 through 1802.2.7.

(3) QUESTIONABLE SOIL. Substitute the following wording for the requirements in IBC section 1802.2.1: Where the safe-sustaining power of the soil is in doubt, or where a load-bearing value superior to that specified in this code is claimed, the necessary investigation shall be made. Such investigation shall comply with the provisions of IBC sections 1802.4 through 1802.6.

What is the necessary investigation if it is simply one in accordance with the code? Second sentence could not have been just one.

(4) EXPANSIVE SOILS. Substitute the following wording for the requirements in IBC section 1802.2.2: In areas likely to have expansive soil, soil tests shall be conducted to determine where such soils do exist.

Comm 62.1805 Alternate setback and clearance. Substitute the following wording for the requirements in IBC section 1805.3.5: Alternate setbacks and clearances are permitted, subject to the approval of the building official.

Comm 62.1807 Pier and pile foundations (1) DEFINITION OF NEUTRAL PLANE. This is a department definition in addition to the definitions in IBC section 1807.1: **NEUTRAL PLANE.** A pile's neutral plane is the level at which drag load, accumulated from the top down, added to the long-term static service load, equals the upward acting shaft resistance accumulated from the bottom up, added to the pile's toe resistance.

(2) DOWNDRAW. This is a department rule in addition to the requirements in IBC section 1807.2.1: Investigations and reports for pier or pile foundations shall include analysis of whether downdraw is anticipated. Where downdraw is anticipated, the report shall include a determination of the position of the pile's neutral plane, an estimate of the soil settlement at the neutral plane, and a determination of the maximum load at the neutral plane.

(3) DETERMINATION OF ALLOWABLE LOADS. Substitute the following wording for the requirements in IBC section 1807.2.8.1:

(a) The allowable axial and lateral loads on piers or piles shall be determined by an approved formula, load tests or static analysis.

(b) The factor of safety to be used for pier or pile design shall depend on the extent of field testing performed to verify capacity.

(c) If the ultimate capacity is assessed solely by static analysis, a minimum factor of safety of 3.0 shall be applied to the ultimate capacity to determine allowable load capacity.

(d) If only static analysis and dynamic field testing are performed, a minimum factor of safety of 2.5 shall be applied to the ultimate capacity to determine load capacity.

(e) If one or more static load tests are performed, in addition to the analysis and tests described above, a minimum factor of safety of 2.0 shall be applied to the ultimate allowable capacity.

(f) A minimum factor of safety of 2.0 shall be used for occupiable structures provided that all of the conditions in subds. 1 to 5 are met. A minimum factor of safety of 1.5 may be used for non-occupiable structures, provided that the deep foundations are required only to control settlement, and it can be demonstrated that deep foundations are not required to prevent a bearing capacity failure.

(4) **LOAD TESTS.** This is a department alternative to the requirements in IBC section 1807.2.8.3: The ultimate capacity of the pile shall be defined as the load at which the average pile head deflection is defined by the following equation:

$$\delta = (Pl/AE) + 0.15'' + (B/120)$$

Where:

δ = average pile head deflection, inches

P = applied load, pounds

l = pile length, inches

A = transformed pile area of pile (to steel)

E = modulus of elasticity (of steel)

B = outside diameter (or width) of pile, inches

The calculation shall be predicated on an assumed end-bearing condition.

(5) **PILES IN SUBSIDING AREAS.** Substitute the following wording for the requirements in IBC section 1807.2.11:

(a) Where piles are driven through subsiding fills or other subsiding strata and derive support from underlying firmer materials, consideration shall be given to the downward drag load that may be imposed on the piles by the subsiding upper strata.

(b) Where the influence of subsiding fills is considered as imposing loads on the pile, the allowable stresses specified in this chapter are permitted to be increased where satisfactory substantiating data are submitted.

(c) The position of the pile's neutral plane shall be determined, and the settlement of the soil at the level of the neutral plane shall be estimated. The maximum load in the pile, which occurs at the neutral plane, shall be determined.

Comm 62.1808 Driven pile foundations. Substitute the following wording for the requirements in IBC section 1808.1.3: Any sudden decrease in driving resistance of an end-supported timber pile shall be investigated with regard to the possibility of damage. If the sudden decrease in driving resistance cannot be correlated to load-bearing data, the pile shall be removed for inspection or rejected, or shall be assigned a reduced capacity commensurate with the loss of end-bearing in lieu of removing or rejecting the pile.

Comm 62.1809 Concrete pile foundations. (1) DIMENSIONS FOR DRILLED OR AUGERED UNCASSED PILES. Substitute the following wording for the exception in IBC section 1809.3.2: The length of the pile is permitted to exceed 30 times the diameter, provided that the design and installation of the pile foundation is under the direct supervision of a registered design professional knowledgeable in the field of soil mechanics and pile foundations.

(2) DIMENSIONS FOR DRIVEN UNCASSED PILES. Substitute the following wording for the exception in IBC section 1809.4.2: The length of the pile is permitted to exceed 30 times the diameter, provided that the design and installation of the pile foundation is under the direct supervision of a registered design professional knowledgeable in the field of soil mechanics and pile foundations.

Comm 62.1905 Concrete testing. Substitute the following wording for the requirements in IBC section 1905.6.1: Concrete shall be tested in accordance with the requirements in IBC sections 1905.6.2 through 1905.6.5.

Comm 62.1914 Shotcrete clearance. The exception in IBC section 1914.4.2 is not included as part of this code.

Comm 62.1916 Column approvals. Substitute the following wording for the requirements in IBC section 1916.6.: Details of column connections and splices shall be shop-fabricated by approved methods and shall be approved only after tests in accordance with the approved rules. Shop-fabricated concrete-filled pipe columns shall be inspected by a representative of the manufacturer at the plant.

Comm 62.2101 Masonry construction materials. (1) CONSTRUCTION DOCUMENTS. The requirements in IBC section 2101.3 are not included as part of this code.

(2) FIREPLACE DRAWINGS. The requirements in IBC section 2101.3.1 are not included as part of this code.

Comm 62.2103 Cast stone masonry units. These are department rules in addition to the requirements in IBC section 2103.3:

(1) Cast stone masonry units covered under this category are homogeneous or faced, dry cast concrete products other than conventional concrete masonry units (brick or block), but of similar size.

(2) Cast stone masonry units shall be made with portland cement, water and suitable mineral aggregates, with or without admixtures, and reinforced if required.

(3) Cast stone masonry units shall have a minimum compressive strength of 6500 psi and a maximum water absorption of 6% when tested as 2- x 2-inch cylinders or cubes.

Comm 62.2105 Masonry quality. The requirements in IBC section 2105.1 are not included as part of this code.

Comm 62.2108 Quality assurance provision. The requirements in IBC section 2108.2 are not included as part of this code.

Comm 62.2109 Empirical design of masonry. (1) **BEARING ON MASONRY.** This is a department rule in addition to the requirements in IBC section 2109.1: Lintels shall be considered structural members and shall be designed in accordance with the applicable provisions of IBC chapter 16.

(2) **OPENINGS.** This is a department rule in addition to the requirements in IBC section 2109.4.1: Unless evidence is provided to show that openings do not cause lateral stability and stress requirements to be exceeded, the amount of openings in a masonry wall shall not exceed the limits set forth in Table 62.2109-1.

Table 62.2109-1
Maximum Ratio of Laterally Unsupported Height or
Length to Thickness for Exterior Walls With Openings[†]

Type of Masonry	Percent of Openings at Any Horizontal Plane of Wall			
	20	40	60	Over 60
Single wythe walls of solid or grouted walls of solid units	20	16	12	Submit design
All other masonry	18	14	10	calculations

[†]The percentage of openings shall be calculated for each 100 lineal feet of wall or portion thereof at any horizontal plane of wall.

(3) **JOINTING.** These are department rules in addition to the requirements in IBC section 2109:

(a) *Expansion and shrinkage.* Joints commensurate with lateral stability requirements shall be installed in all exterior masonry to allow for expected growth of clay products and shrinkage of concrete products.

(b) *Vertical jointing.* Vertical control joints shall be provided at a spacing in compliance with Table 62.2109-2.

Table 62.2109-2

**Maximum Spacing Of Exterior Masonry Control Joints
Between Unrestrained Ends[†] (Feet)**

Loading Conditions	Type of Material	Openings (Percent of Total Wall Area)			
		0 to 20		More than 20	
		Joint to Joint	Joint to Corner	Joint to Joint	Joint to Corner
Load-bearing	Clay units	140	70	100	50
	Concrete units	60	30	40	20
Nonload-bearing walls	Clay units	100	50	60	40
	Concrete units	50	25	30	20

[†]Jointing required is a minimum and is not intended to prevent minor cracking. The distances given for maximum spacing of joints are for a single wall plane. For composite walls, the maximum spacing of joints shall be governed by the masonry material type used in the exterior wythe.

Note: To accomplish the intended purpose, joints should be located at critical locations, such as changes in building heights, changes in framing systems, columns built into exterior walls, major wall openings, and changes in materials.

(c) *Horizontal jointing.* Where supports such as shelf angles or plates are required to carry the weight of masonry above the foundation level, a pressure-relieving joint shall be provided between the structural support and any masonry that occurs below this level. The joint width shall be such as to prevent any load being transmitted from the support to any element directly below. All mortar and rigid materials shall be kept out of this joint. This type of joint shall be provided at all such supports in a concrete frame structure where clay masonry is exposed to the weather.

Comm 62.2208 Welding of structural steel. Substitute the following wording and informational note for the requirements in IBC section 2208.1: The details of design, workmanship and technique for welding, inspection of welding, and qualifications of welding operators shall conform to the requirements of the specifications listed in IBC sections 2204, 2205, 2206 and 2207.

Note: The rules pertaining to registration of structural welders are specified in ch. Comm 5.

Comm 62.2303 Truss design drawings. The requirements in IBC section 2303.4.1 are not included as part of this code.

Comm 62.2304 Girder ends. This is a department rule in addition to the requirements in IBC section 2304.11.2.4: A moisture barrier shall be provided between an untreated or nondurable wood girder and an exterior masonry or concrete bearing surface.

Comm 62.2503 Gypsum board and plaster. The requirements in IBC section 2503.1 are not included as part of this code.

Comm 62.2900 Additional criteria for toilets. These are department rules in addition to the requirements in IBC chapter 29:

(1) **MAINTENANCE.** Every toilet room and every part thereof shall be kept clean and in good repair.

(2) **SERVICE SINK.** In every building where a service sink is required by Table 2902.1, the service sink shall be located in a service closet or room that is provided with the supplies necessary for the sanitary upkeep of the toilet rooms.

(3) **PERMANENT AND PORTABLE OUTDOOR TOILETS.** (a) *General.* Where local conditions or situations make it impractical to install a private onsite wastewater treatment system, permanent or portable outdoor toilets, or other sanitation systems or devices as described in ch. Comm 91, may be used, except as specified in par. (b).

Note: See ch. Comm 83 for detailed requirements for private onsite wastewater treatment systems.

(b) *Exception.* For places of employment for more than 10 persons, schools larger than 2 rooms, and apartment houses, water-flush toilets shall be provided, unless outdoor toilets or other sanitation systems or devices are permitted in writing by the department.

(c) *Permanent outdoor toilets.* Permanent outdoor toilets, consisting of composting toilet systems, incinerating toilets, or privies shall comply with ch. Comm 91, s. Comm 62.1209, and this section.

1. A permanent outdoor toilet shall be provided with a suitable approach, such as a concrete, gravel, or cinder walk.

2. All windows, ventilators, and other openings for permanent outdoor toilets shall be screened to prevent the entrance of flies, and all doors shall be self-closing.

(d) *Portable outdoor toilets.* 1. No portable outdoor toilet may be erected or maintained within 50 feet of any well; 10 feet of the line of any street or public thoroughfare, unless vehicular traffic has been detoured while the portable toilet is in use; 5 feet of the property line between premises; or 25 feet of a door, window, or other outdoor opening of any building.

2. A portable outdoor toilet shall be stabilized to prevent it from tipping over.

3. A portable outdoor toilet shall be located with an approach such that access is unobstructed and free of brush, debris, and standing water.

Note: Chapter Comm 91 contains requirements for storage chambers of portable toilets.

Note: Chapters NR 113 and NR 114 contain requirements for servicing portable toilets.

(4) **ENCLOSURE OF FIXTURES.** (a) Water closets and urinals within a toilet room shall be arranged to ensure privacy. Except as provided in par. (b), each water closet shall occupy a separate compartment, with walls or partitions and a door enclosing the fixtures to

ensure privacy. Urinals shall be placed against walls at least 6 feet 8 inches high and arranged individually with or without partitions.

(b) 1. Water closet compartments may be omitted in a single-occupant toilet room having a door with a privacy lock.

2. Toilet rooms located in day-care and child-care facilities and containing two or more water closets may have one water closet without an enclosing compartment.

Comm 62.2902 Plumbing fixtures. (1) MINIMUM NUMBER OF FIXTURES. (a) Exception. This is a department exception to the requirements in IBC section 2902.1: Where more than one water closet is required for males, urinals may be substituted for up to 50 percent of the required number of water closets.

(b) *Additional fixtures.* These are department informational notes to be used under IBC sections 2902.1 and 2902.2:

Note: Additional plumbing fixtures may be required for employees by the U.S. department of labor, occupational safety and health act (OSHA) regulations.

Note: Additional plumbing fixtures may be required by the department of health and family services for restaurants, mobile home parks, camping grounds, camping resorts, recreational camps and educational camps.

Note: Chapter Comm 90 also has requirements for minimum numbers of sanitary fixtures for a public swimming pool, as based on the pool area. For some buildings, the minimum number of sanitary fixtures determined in that manner may be larger than the minimum number determined in accordance with this section. Compliance with this section does not relieve an owner from complying with ch. Comm 90.

(2) **LAVATORIES FOR TOILET ROOMS.** This is a department rule in addition to the requirements in IBC section 2902.1: At least one lavatory shall be provided in each toilet room or in a sex-designated lounge adjacent to the toilet room. If a multiple-use lavatory is provided, 24 lineal inches of wash sink, or 20 inches measured along the edge of a circular basin will be considered equivalent to one lavatory.

(3) **SIGNAGE FOR TOILET ROOMS.** This is a department rule in addition to the requirements in IBC section 2902.2: Toilet rooms shall be designated by legible signs.

(4) **PUBLIC FACILITIES.** This is a department alternative to the requirements in IBC section 2902.6: Toilet rooms may be omitted in a small retail or mercantile building where all of the following requirements are met:

(a) No more than 25 occupants are accommodated.

(b) Other restrooms are conveniently located and available to the patrons and employees during all hours of operation.

(d) The omission is approved in writing by the local unit of government.

(e) A copy of the written approval from the local unit of government is provided to the department or its authorized representative upon request.

(5) LOCATION OF RESTAURANT TOILET ROOMS. This is a department informational note to be used under IBC section 2902.6:

Note: Additional location requirements for restaurant toilet rooms may be applied by the department of health and family services.

(6) MERCANTILE TOILET ROOMS. This is a department rule in addition to the requirements in IBC section 2902.6: Toilet rooms for customers in business and mercantile occupancies shall be directly accessible to the customers, rather than accessible through an employee work area.

(7) PAY FACILITIES. Substitute the following wording for the requirements in IBC section 2902.6.2: All toilet facilities shall be free of charge.

Note: Section 146.085, Stats., prohibits charging a fee for the use of toilet facilities and imposes a fine of \$10 to \$50 for violations.

Comm 62.3001 Elevators. (1) SCOPE. Substitute the following wording for the requirements in IBC section 3001.1: This chapter governs the design, construction, installation, alteration and repair of elevators, dumbwaiters, escalators, moving walks and their components.

(2) REFERENCED STANDARDS. Substitute the following wording for the requirements in IBC section 3001.2: Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators, dumbwaiters, escalators, moving walks and their components shall comply with ch. Comm 18.

(3) CHANGE IN USE. Substitute the following wording for the requirements in IBC section 3001.4: A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with ch. Comm 18.

Comm 62.3004 Hoistways. (1) VENTING. This is a department rule in addition to the requirements in IBC section 3004.3: A ventilation opening in a hoistway wall, where provided, shall have guards securely anchored to the supporting structure inside the hoistway. The guards shall consist of a wire-mesh screen of at least 0.0915-inch diameter steel wire with openings that will reject a ball one-inch in diameter, or expanded metal screen of equivalent strength and open area.

(2) PLUMBING AND MECHANICAL SYSTEMS. Substitute the following wording for the exception in IBC section 3004.5: Floor drains, sumps and sump pumps shall be permitted at the base of the shaft provided they are directly connected to the storm or clear water drain system. Connection to a sanitary system is prohibited.

Comm 62.3006 Machine rooms. (1) PRESSURIZATION. This is a department exception to the requirements in IBC section 3006.3: An elevator machine room which serves

a pressurized elevator hoistway and which is not directly connected to the pressurized elevator shaft is not required to be pressurized.

(2) PLUMBING SYSTEMS. Substitute the following wording for the requirements in IBC section 3006.6: Plumbing systems not used in connection with the operation of the elevator may not be located in elevator equipment rooms.

Comm 62.3102 Blower equipment. Substitute the following wording for exception 2 in IBC section 3102.8.1.2: Blowers shall be provided with inlet screens, belt guards and other protective devices as required to provide protection from injury.
By what? or when

Comm 62.3103 Temporary structures. The requirements in IBC section 3103.1.1 and 3103.2 are not included as part of this code.

Comm 62.3104 Pedestrian walkways and tunnels. (1) SEPARATE STRUCTURES. Substitute the following wording for the requirements and exception in IBC section 3104.2: Buildings that are connected in accordance with IBC section 3104 shall be considered to be separate structures.

(2) CONTENTS. The requirements in IBC section 3104.4 are not included as part of this code.

Comm 62.3109 Swimming pool enclosures. Substitute the following informational note for the requirements in IBC section 3109.

Note: See ch. Comm 90 for requirements for swimming pool enclosures.

Comm 62.3200 Encroachments into the public right-of-way. The requirements in IBC chapter 32 are not included as part of this code.

Comm 62.3300 Safeguards during construction. (1) GENERAL. Except for the requirements in IBC sections 3302.1 and 3303.5, the requirements in IBC chapter 33 are not included as part of this code.

(2) PROTECTION OF ADJOINING PROPERTY. This is a department informational note to be used under IBC chapter 33:

Note: Sections 101.111 (1) to (6), Stats., read as follows: "(1) DEFINITION. In this section 'excavator' means any owner of an interest in land making or causing to be made an excavation.

"(2) CAVE-IN-PREVENTION. Any excavator shall protect the excavation site in such a manner so as to prevent the soil of adjoining property from caving in or settling.

"(3) LIABILITY FOR UNDERPINNING AND FOUNDATION EXTENSIONS. (a) If the excavation is made to a depth of 12 feet or less below grade, the excavator may not be held liable for the expense of any necessary underpinning or extension of the foundations of buildings on adjoining properties.

"(b) If the excavation is made to a depth in excess of 12 feet below grade, the excavator shall be liable for the expense of any necessary underpinning or extension of the foundations of any adjoining buildings below

the depth of 12 feet below grade. The owners of adjoining buildings shall be liable for the expense of any necessary underpinning or extension of the foundations of their buildings to the depth of 12 feet below grade.

"(4) NOTICE. Unless waived by adjoining owners, at least 30 days prior to commencing the excavation the excavator shall notify, in writing, all owners of adjoining buildings of his or her intention to excavate. The notice shall state that adjoining buildings may require permanent protection. The owners of adjoining property shall have access to the excavation site for the purpose of protecting their buildings.

"(5) EMPLOYEES NOT LIABLE. No worker who is an employee of an excavator may be held liable for his or her employer's failure to comply with this section.

"(6) FAILURE TO COMPLY; INJUNCTION. If any excavator fails to comply with this section, any aggrieved person may commence an action to obtain an order under ch. 813 directing such excavator to comply with this section and restraining the excavator from further violation thereof. If the aggrieved person prevails in the action, he or she shall be reimbursed for all his or her costs and disbursements together with such actual attorney fees as may be approved by the court."

Comm 62.3400 Existing structures. (1) EXCLUSIONS. The requirements in IBC sections 3401 to 3405, 3407 and 3409 are not included as part of this code.

(2) COMMUNITY-BASED RESIDENTIAL FACILITIES SERVING 9-20 UNRELATED RESIDENTS. This is a department rule in addition to the requirements in IBC chapter 34: Where an existing building is being converted to an I-1 Institutional use and the building will contain fewer than 20 persons, the building shall be classified as Group R-4. The provisions of this code as applicable to the Group R-4 occupancy shall apply.

Comm 62.3406 Historic buildings. Substitute the following wording for the requirements in IBC section 3406.1: The construction, repair, alteration, addition, restoration, movement, and change of occupancy of historic structures shall comply with ch. Comm 70.

Comm 62.3408 Accessibility for existing buildings. (1) SCOPE. Substitute the following wording for the requirements and exception in IBC section 3408.1:

(a) Except as specified in par. (b), the requirements in IBC sections 3408.2 to 3408.5.14 apply to maintenance, change of occupancy, additions and alterations to existing buildings, including those identified as historic buildings.

(b) In group R-2 existing apartment houses with 3 or more dwelling units, when the dwelling units are remodeled, the dwelling units shall comply with par. (b). The term "remodeled" has the meaning given in s. 101.132 (1) (h), Stats.

Note: Under section 101.132 (1) (h), Stats., "remodel" means to substantially improve, alter, extend or otherwise change the structure of a building or change the location of exits, but does not include maintenance, redecoration, reroofing or alteration of mechanical or electrical systems.

(2) ACCESSIBILITY REQUIREMENTS FOR REMODELED R-2 APARTMENT HOUSES. These are department rules in addition to the requirements in IBC section 3408.5:

(a) *Existing group R-2 apartment housing* When existing group R-2 apartment housing with 3 or more dwelling units is remodeled, the remodeling percentages specified in s.

101.132 (2) (b), Stats., ~~shall be applied~~, and the remodeling shall comply with IBC section 1107.5.4 and s. Comm 62.1106.

as per the attached sketch
Note: Section 101.132 (2) (b), Stats., reads as follows: "1. If more than 50% of the interior square footage of any housing with 3 or more dwelling units is to be remodeled, the entire housing shall conform to the standards in par. (a), regardless of when the housing was first intended for occupancy.

"2. If 25% to 50% of the interior square footage of any housing with 3 or more dwelling units is to be remodeled, that part of the housing that is to be remodeled shall conform to the standards in par. (a), regardless of when the housing was first intended for occupancy.

"3. If less than 25% of the interior square footage of any housing with 3 or more dwelling units is to be remodeled, the remodeling is not subject to the standards in par. (a) unless the alteration involves work on doors, entrances, exits or toilet rooms, in which case the doors, entrances, exits or toilet rooms shall conform to the standards in par. (a) regardless of when the housing was first intended for occupancy."

(b) *Existing buildings with multiple occupancies.* If an existing building, which contains multiple occupancies including R-2 apartment housing with 3 or more dwelling units, is remodeled, an accessible route shall be provided to the remodeled dwelling units, unless the cost to provide the accessible route exceeds 20 percent of the cost of the alteration, as specified in IBC section 3408.6.

(3) **PLATFORM LIFTS.** Substitute the following wording for the requirements in IBC section 3408.7.2: Platform lifts complying with ch. Comm 18 shall be permitted as a component of an accessible route.

Comm 62.3500 Referenced standards. Substitute the following NFPA standards for the corresponding standards listed in IBC chapter 35: NFPA 13-1999, 13R-1999 and 72-1999.

Comm 62.3600 Appendices. IBC Appendices A to J are not included as part of this code.

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Chapter Comm 63 ENERGY CONSERVATION

Subchapter I — Purpose, Scope, Application and Compliance

Comm 63.0001 Purpose. The purpose of this chapter is to regulate the design of building envelopes for adequate thermal resistance and low air leakage and the design and selection of mechanical, electrical, service water-heating and illumination systems and equipment which will enable effective use of energy in new building construction.

Comm 63.0002 Scope. (1) GENERAL. The scope of this chapter is as specified in s. Comm 61.02, except as exempted in sub. (2). *This is unclear. When this sub 3 is not included in the scope of this chapter, the energy is not included in (2).*

(2) EXEMPT BUILDINGS AND STRUCTURES. The following buildings or portions of buildings shall be exempt from this chapter.

(a) Buildings, or portions thereof, without space heating or cooling, service water heating, or illumination are exempt from the requirements of this chapter that apply to those systems.

(b) Buildings and structures, or portions thereof separated by building envelope assemblies from the remainder of the building, that have a peak design rate of energy usage less than 3.4 Btu/h per square foot or 1.0 watt per square foot of floor area for all purposes are exempt.

Comm 63.0003 Application. This chapter shall be applied as specified in s. Comm 61.03 and as modified in subs. (1) to (4). *Since there is an exemption in 61.03 that says "as specified in s. Comm 61.03 (1) to (4)"*

Note: It is the intent of the department to have every new building or addition and every change of occupancy meet the energy conservation requirements of this chapter. Air conditioning may be installed in existing buildings, and existing equipment with several years of service may continue to be used in existing buildings, even if the existing equipment does not meet the required efficiencies of this chapter.

(1) ADDITIONS. (a) Building Envelope. Additions to existing buildings or structures may be made without making the entire building or structure comply with the building envelope requirements of this chapter, but the addition envelope shall comply with this chapter.

(b) *HVAC systems.* If an HVAC system serves both the existing building and the addition, any portion of the system or equipment that is altered shall comply with this chapter.

(c) *Lighting systems.* Lighting systems installed in a new addition or in conjunction with an increase of floor area, such as the addition of a mezzanine, shall comply with this chapter.

(2) ALTERATIONS. (a) Building envelope. Alterations to the building envelope shall comply with one of the following:

1. The alteration shall not increase the rate of heat loss through the portion of the building envelope containing the alteration.

2. The alteration shall not increase the annual energy use from heat gain or loss through the entire building envelope.

3. The building envelope shall be brought into compliance with the requirements of this chapter.

(b) *HVAC systems.* Rooftop fan systems that replace existing fan systems shall be provided with economizers that comply with this chapter for new construction.

(c) *Lighting systems.* 1. When alterations to an existing lighting system increase the connected interior lighting load of the building or replace more than 50% of the lighting fixtures, the interior lighting system shall comply with ss. Comm 63.1044 to Comm 63.1049.

2. When alterations to an existing lighting system increase the connected exterior lighting load or replace more than 50% of the lighting fixtures, the entire exterior lighting system shall comply with ss. Comm 63.1041 to Comm 63.1043.

3. a. Except as specified in subd. b., alterations that replace controls shall comply with ss. Comm 63.1050 and Comm 63.1051.

b. Shut-off lighting controls in s. Comm 63.1050 (4) are not required in contiguous altered spaces of less than 5,000 square feet unless shut-off controls were required by the building code at the time of the original lighting design or if an exception to s. Comm 63.1050 (4) (b) is no longer applicable.

(3) **CHANGE IN USE.** (a) Any change in the occupancy classification of a building or structure that would increase the required minimum inside temperature as specified in Table 64.0403 shall not be permitted unless the building is made to comply with the requirements of this chapter.

(b) Any change in a building or structure that would result in an increase in demand for either fossil fuel or electrical energy supply shall comply with this chapter.

(4) **MIXED RESIDENTIAL AND COMMERCIAL OCCUPANCY.** (a) *General.* Except as specified in par. (b), when a building houses both a residential and a commercial occupancy, each portion of the building shall conform to the requirements for the occupancy, residential or commercial, housed therein. Where minor accessory uses do not occupy more than 10 percent of the area of any floor of a building, the major use shall determine whether the building is a residential or commercial building.

(b) *Exception.* All buildings with a height of four or more stories above grade shall be considered a commercial building for purposes of this chapter.

Comm 63.0004 Compliance. (1) GENERAL. All buildings shall comply with the International Energy Conservation Code (IECC), with the changes, additions or omissions specified in subch. VIII, and with the compliance approaches specified in sub. (2) for residential building and sub. (3) for commercial buildings.

(2) RESIDENTIAL BUILDINGS. (a) Except as specified in par. (b), for residential buildings any one of the following approaches for compliance shall be used:

1. A systems approach for the entire building and its energy-using subsystems, which uses renewable sources as specified in IECC, chapter 4.

2. An approach based on performance of individual components of the building envelope as specified in IECC chapter 5.

3. An approach based on performance of the total building envelope specified in IECC chapter 5.

4. An approach based on acceptable practice for each envelope component specified in IECC chapter 5.

5. An approach by prescriptive specification for individual components of the building envelope specified in IECC chapter 5.

6. An approach based on simplified, prescriptive specification specified in IECC chapter 6 when the glazing areas does not exceed 15 percent of the gross areas of exterior walls.

(b) This chapter does not apply to type A-1 residential buildings as defined in IECC section 201.1 as one and two family dwellings.

(3) COMMERCIAL BUILDINGS. For commercial buildings one of the following approaches for compliance shall be used:

(a) A prescriptive, system, or energy cost budget approach specified in subch. III.

(b) A prescriptive or performance option specified in IECC chapter 8.

Subchapter II-Changes, additions or omissions to adopted standard IECC

Comm 63.0100 Changes, additions or omissions to IECC. Changes, additions or omissions to the IECC are specified in this subchapter and are rules of the department and are not requirements of the IECC.

Comm 63.0101 Scope and general requirements. Substitute the following wording for the requirements in IECC section 101: Requirements relating to purpose, scope and application are contained in subch. I.

Comm 63.0102 Materials, systems and equipment. This is a department rule in addition to the requirements specified in IECC section 102: The installation or use of heated sidewalks is prohibited as specified in s. 101.124, Stats.

Note: Section 101.124, Stats., reads as follows: "Heated Sidewalks Prohibited. In this section "exterior pedestrian traffic surface" means any sidewalk, ramp, stair, stoop, step, entrance way, plaza or pedestrian bridge not fully enclosed within a building and "heated" means heated by electricity or energy derived from the combustion of fossil fuels, but not including the use of waste thermal energy. "Exterior pedestrian traffic surface" does not include any means of ingress or egress by the physically disabled required under s. 101.13 (2). No person may construct a heated exterior pedestrian traffic surface. The department or any city, village, town or county is prohibited from approving any plan under s. 101.12 which includes such heated surface. The department shall order any existing heated exterior pedestrian traffic surface in operation to be shut off. This section does not apply to any inpatient health care facility as defined in s. 50.135 (1), or community-based residential facility, as defined in s. 50.01 (1g)."

Comm 63.0103 Alternate materials-method of construction, design or insulating systems. The requirements in IECC section 103 are not included as part of this code.

Comm 63.0104 Construction Documents. Substitute the following wording for the requirements in IECC section 104: Construction documents and other supporting documents shall be submitted in accordance with ch. Comm 61.

Comm 63.0105 Inspections. Substitute the following wording for the requirements in IECC section 105: Inspections shall be performed in accordance with the ch. Comm 61.

Comm 63.0107 Conflicting requirements. Substitute the following wording for the requirements in IECC section 107.2: The process for dealing with conflicting rules shall be as specified in ch. Comm 61.

Comm 63.0201 General definitions. (1) This is a department definition in addition to the definitions in IECC section 201.1: "Circulating system" means service water heating system without a heat trap, or systems with circulating pump.

(2) Substitute the following wording for the definition specified in IECC section 201.1: "Approved" has the meaning given in ch. Comm 62.

Comm 63.0302 Exterior design parameters. (1) WEATHER ADJUSTMENTS. Substitute the following wording for the requirements in IECC Table 302.1 footnote a: The outdoor design temperature shall be selected from the columns of 97-1/2 percent values for winter and 2-1/2 percent values for summer from tables in the ASHRAE *Handbook of Fundamentals*. Adjustments shall be permitted to reflect local climates, which differ from the tabulated temperatures, or local weather experience as determined by other weather resources.

Is this contained in ASHRAE Handbook? IEC?

(2) **DEGREE-DAYS.** Substitute the following wording for the requirements in IECC Table 302.1, footnote b: The degree days heating (base 65° F) and cooling (base 65° F) shall be selected from NOAA "Annual Degree Days to Selected Bases Derived from the 1961-1990 Normals," the ASHRAE Handbook of Fundamentals, data available from adjacent military installations, or other sources of local weather data.

Comm 63.0402 System analysis. Substitute the following wording for the requirements in IECC section 402.4.7: The same calculation tool shall be used to estimate the annual energy usage for space heating and cooling of the Standard design and the Proposed design. The calculation tool shall be approved by the department.

Comm 63.0502 Building envelope. (1) GENERAL. Substitute the following wording for the requirements in IECC section 502.1.1, including the exceptions:

(a) *Moisture control.* Except as specified in par. (2), the design shall not create conditions of accelerated deterioration from moisture condensation. Vapor retarders shall be provided on all warm-in winter sides of frame walls, floors and ceilings. The vapor retarder shall have a maximum permance rating of 1.0 perm when tested in accordance with Procedure A of the ASTM E96. The vapor retarder shall be installed on the warm-in winter side of the thermal insulation.

Linear case

(b) **EXCEPTIONS.** Where other approved means to avoid condensation in unventilated framed wall, floor, roof and ceiling cavities are provided. - *I assume this is a list and it does not need to be a complete sentence*

(2) **FLOORS OVER UNHEATED SPACES.** Substitute the following wording for the requirements in IECC section 502.2.3.3: The floor section over an unheated space shall be selected from IECC Appendix Table 502.2.3.3 for the overall thermal transmittance factor (U_o) not exceeding the value specified for floors over unheated spaces in IECC Table 502.2. For floors over outdoor air, such as, overhangs, U-values for heating shall meet the same requirement for floors over unheated spaces in IECC Table 502.2.

Comm 63.0503 Building mechanical systems and equipment. (1) LOAD CALCULATIONS. Substitute the following wording for the requirements in IECC section 503.3.1: Heating load calculations shall be determined in accordance with s. Comm 63.1023.

(2) **DISTRIBUTION, SYSTEM, CONSTRUCTION AND INSULATION. (a) Hydronic piping insulation.** Substitute the following wording for the requirements in IECC section 503.3.3.1: All system piping shall be thermally insulated in accordance with Comm 63.1029 (1) and (2).

(b) *Duct and plenum insulation.* Substitute the following wording for the requirements in IECC section 503.3.3.3. Duct and plenum insulation shall be provided in accordance with IECC section 803.2.8.

(c) *Mechanical ventilation.* Substitute the following wording for the requirements in IECC section 503.3.3.5: Each mechanical ventilation system (supply or exhaust, or both) shall be equipped with a readily accessible switch or other means for shutoff, or volume reduction and shutoff, when ventilation is not required. Automatic or gravity dampers that close when the system is not operating shall be provided for outdoor air exhausts. Automatic dampers shall be provided on all outdoor air intakes.

(d) *Balancing.* Substitute the following wording for the requirements in IECC 503.3.3.7: Balancing and documentation of the HVAC system shall conform to the IMC.

Comm 63.0504 Service water heating. (1) COMBINATION SERVICE WATER-HEATING AND SPACE HEATING BOILERS. The requirements in IECC section 504.2.2, Exception 1, are not included as part of this code chapter.

(2) PIPE INSULATION. Substitute the following wording for the requirements in IECC section 504.5: Pipe insulation shall be provided in accordance with s. Comm 63.1029 (1) and (2).

(3) SWIMMING POOLS. The requirements in IECC section 504.3, and IECC sections 504.3.1 to 504.3.3 are not included as part of this code chapter.

(4) LIGHTING POWER BUDGET. Substitute the following wording for the requirements in IECC section 505.2: Lighting systems shall comply with ss. Comm 63.1040 to Comm 63.1053.

Comm 63.0602 Building Envelope. (1) THERMAL PERFORMANCE CRITERIA, FLOORS OVER OUTSIDE AIR. Substitute the following wording for the requirements in IECC section 602.1.4: Where the basement is considered a conditioned space, the basement shall be insulated in accordance with IECC section 502.2.3.3 and s. Comm 63.0502.

(2) CAULKING, SEALANTS AND GASKETING. This is a department rule in addition to the requirements in IECC section 602.1.10: When installed in the building envelope, recessed lighting fixtures shall comply with IECC section 502.1.3.

Comm 63.0701 General scope and application. Substitute the following wording for the requirements in IECC section 701.1: Commercial buildings shall meet the requirements of subch. III or they shall comply with the requirements specified in IECC chapter 8.

Comm 63.0802 Building envelope requirements. (1) GENERAL. These are department rules in addition to the requirements of IECC 802.1: Glazed structures or glazed portions of buildings used for the production of plant life or for maintaining plant life as the primary purpose of the structure are exempt from the building envelope requirements. When the glazed areas are attached to a building with a different class of construction, these glazed areas shall be separated from the remainder of the building with construction material complying with the building envelope requirements.

(2) **MOISTURE CONTROL.** Substitute the following wording for the requirements in IECC section 802.1.2, intro. paragraph and exceptions:

(a) *Moisture control.* Except as specified in par (b), vapor retarders shall be provided on all warm-in winter sides of frame walls, floors and ceilings. The vapor retarder shall have a maximum permance rating of 1.0 perm when tested in accordance with Procedure A of the ASTM E96, on the warm-in-winter side of the insulation.

(b) ^{Exception} Where other approved means to avoid condensation in unventilated framed wall, floor, roof and ceiling cavities are provided.

(3) **CRITERIA.** Substitute the following wording for the requirements in footnote a. in IECC Tables 802.2(1), 802.2(2), 802.2(3) and 802.2(4): Values shall be determined from IECC Tables 802.2(5) through 802.2(37) using climate zone 15 specified in IECC Table 302.1 (50).

(4) **SEALING OF THE BUILDING ENVELOPE.** This is a department rule in addition to the requirements in IECC section 802.3.2: When installed in the building envelope, recessed lighting fixtures shall comply with IECC section 502.1.3.

Comm 63.0803 Building mechanical systems. (1) GENERAL. This is a department rule in addition to the requirements in IECC section 803.1: Electrical motors shall comply with s. Comm 63.1032.

(2) **SIMPLE HVAC SYSTEMS AND EQUIPMENT.** (a) *Equipment and system sizing.* Substitute the following wording for the requirements in IECC section 803.2.1.1: Heating and cooling equipment and systems shall be sized to provide the minimum space and system loads calculated in accordance with IECC section 803.2.1.

(b) *Temperature controls.* Substitute the following wording for the requirements in IECC section 803.2.3.1: Each heating and cooling system shall have at least one temperature control device that complies with IECC sections 803.3.3.1.1, 803.3.3.2 and 803.3.3.3.

(c) *Cooling with outdoor air.* Substitute the following wording for the requirements in IECC section 803.2.6: Each fan system shall have economizer controls complying with s. Comm 63.1031.

(d) *Shutoff dampers.* Substitute the following wording for the requirements in IECC section 803.2.7 and the exceptions:

1. 'Outdoor air supply and exhaust ducts.' Except as specified in subd. 2., outdoor air supply and exhaust ducts shall be equipped with motorized dampers in accordance with ch. Comm 64.

2. 'Exceptions.' Outdoor air supply and exhaust ducts restricted by health and life safety requirements are exempt.

(e) *Duct and plenum insulation.* Substitute the following wording for the requirements in IECC section 803.2.8: 1. 'Supply and return air ducts and plenums.' Except as specified in subd. 2., all supply ducts and return air ducts and plenums shall be insulated with a minimum of R-4 insulation when located in unconditioned spaces and with a minimum of R-7.5 insulation when located outside the building envelope. When located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-7.5 insulation. All supply ducts located in plenums within the building envelope shall be insulated to R-4.

2. 'Exceptions.' a. When located within equipment.

b. When the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

3. 'Joints, longitudinal and transverse seams and connections.' All joints, longitudinal and transverse seams, and connections in ductwork, shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded fabric systems, or tapes. Tapes and mastics used to seal ductwork shall be listed and labeled in accordance with UL-181A or UL-181B. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Duct tape is not permitted as a sealant on any ducts.

(3) **COMPLEX HVAC SYSTEMS AND EQUIPMENT.** (a) *Equipment and system sizing.* Substitute the following wording for the requirements in IECC section 803.3.1.1: Heating and cooling equipment and system capacity shall be sized to provide the minimum space and system loads calculated in accordance with IECC section 803.2.1.

(b) *Shutoff damper controls.* Substitute the following wording for the requirements in IECC section 803.3.3.4: 1. Except as specified in subd. 2., both outdoor air supply and exhaust ducts shall comply with s. Comm 64.19 (5).

2. Outdoor air supply and exhaust ducts restricted by health and life safety requirements are exempt.

(c) *Economizers.* Substitute the following wording for the requirements in IECC section 803.3.3.5: Each fan system shall have economizer controls complying with s. Comm 63.1031.

(d) *Piping insulation.* Substitute the following wording for the requirements in IECC section 803.3.7, including the exceptions: All piping serving as part of a heating or cooling system shall be thermally insulated in accordance with s. Comm 63.1029 (1) and (2).

(e) *HVAC system completion.* Substitute the following wording for the requirements in IECC sections 803.3.8, 803.3.8.1, 803.3.8.2, and 803.3.8.3: Balancing and documentation of HVAC systems shall conform to the IMC.

Comm 63.0804 Service water heating. (1) HEAT TRAPS. Substitute the following wording for the requirements in IECC section 804.4: Plumbing piping systems, including those without an integral heat trap shall comply with s. Comm 63.1029 (1) and (2).

(2) PLUMBING PIPE INSULATION. Substitute the following wording for the requirements in IECC section 804.5: All system piping shall be thermally insulated in accordance with s. Comm 63.1029 (1) and (2).

Comm 63.0805 Lighting systems. Substitute the following wording for the requirements in IECC section 805: Lighting systems shall comply with ss. Comm 63.1040 to Comm 63.1053.

Comm 63.0900 Referenced standards. This is a department rule in addition to the requirements in IECC chapter 9: The following standards are hereby incorporated by reference into this code:

(1) ASTM C177-85, Test method for steady-state heat flux measurements and thermal transmission properties by means of the guarded-hot-plate apparatus.

(2) ASTM C335-84, Test method for steady state heat transfer properties of horizontal pipe insulation.

(3) ASHRAE Standard 90.1-89,

(4) National Concrete Masonry Association (NCMA) Evaluation Procedures of Integrally-Insulated Concrete Masonry Walls, dated January 1, 1999.

Note: NCMA Evaluation Procedures may be obtained from National Concrete Masonry Association, 2302 Horse Pen Road, Herndon, Virginia 20171-3499, telephone 703/713-1900 or fax 703/713-1910.

Comm 63.0901 Appendix. The appendix is not included as part of this code. The appendix may be used for information where it does not conflict with department requirements.

Subchapter III Building Design for Commercial Buildings

Part 1 Application

Comm 63.1001 Application. This subchapter shall be applied to all commercial buildings unless the building complies with IECC chapter 8.

Part 2 Definitions

Comm 63.1005 Definitions. In this subchapter:

(1) "Ambient Lighting" is lighting designed to provide a substantially uniform level of illumination throughout an area, exclusive of any provision for special visual tasks or decorative effect. When designed for lower-than-task illuminance used in conjunction with other specific task lighting systems, it is also called "general" lighting.

(2) "Automatic" means self-acting, operating by its own mechanism when actuated by some impersonal influence, such as, a change in current strength, pressure, temperature, or mechanical configuration.

(3) "Automatic time switch control devices" means control devices that are capable of automatically turning loads off and on based on time schedules.

(4) "Building envelope" means the elements of a building that enclose conditioned spaces through which thermal energy may be transferred to or from the exterior or to or from unconditioned spaces.

(5) "Comfort cooling" or "comfort heating" means treating air to control one or more of the following: temperature, relative humidity, or distribution to meet the comfort requirements of the human occupants of the conditioned space.

(6) "Conditioned floor area" or "CFA" means the floor area in square feet of enclosed conditioned space on all floors of a building, as measured at the floor level of the exterior surfaces of exterior walls enclosing the conditioned space.

(6m) "Commercial building" means a building as defined in IECC section 201.1.

(7) "Conditioned space" means a cooled space, heated space, or indirectly conditioned space.

(8) "Cooled space" means an enclosed space within a building that is conditioned by a cooling system with a sensible capacity that either exceeds 5 Btu/hr sq ft or is capable of maintaining a space dry-bulb temperature of 90°F or less at design conditions.

(9) "Daylighting control" means a device that automatically regulates the power input to electric lighting near the fenestration to maintain the desired workplace illumination, thus taking advantage of direct or indirect sunlight.

(10) "Deadband" means the range of values within which an input variable can be varied without initiating any noticeable change in the output variable.

(11) "Degree day" means a unit based upon temperature difference and time, used in estimating annual heating or cooling energy consumption. One degree day accrues for each degree of difference between the daily mean temperature and a reference temperature.

you have to define the area of daylight or use a different term. you can't use the term you are trying to define the term

(12) "Display lighting" means lighting confined to the area of a display that provides a higher level of illuminance than the level of surrounding ambient illuminance.

(13) "Daylit area" means the space on the floor that is the larger of par. (a) or (b) as follows:

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(a) 1. For areas daylit by vertical glazing, the daylit area has the length of 15 feet, or the distance on the floor, perpendicular to the glazing, to the nearest 60-inch or higher opaque partition, whichever is less; and a width of the window plus either 2 feet on each side, the distance to an opaque partition, or one-half the distance to the closest skylight or vertical glazing, whichever is least.

2. For areas daylit by horizontal glazing, the daylit area is the footprint of the skylight plus, in each of the lateral and longitudinal dimensions of the skylight, the lesser of the floor-to-ceiling height, the distance to the nearest 60-inch or higher opaque partition, or one-half the horizontal distance to the edge of the closest skylight or vertical glazing.

(b) The daylit area calculated using a method acceptable to the department.

Note: See Appendix A for additional illustrative information.

(14) "Economizer, air" means a ducting arrangement and automatic control system that allows a cooling supply fan to supply outside air to reduce or eliminate the need for mechanical refrigeration during mild or cold weather.

(15) "Economizer, water" means a system by which the supply air of a cooling system is cooled directly or indirectly or both by evaporation of water or other appropriate fluid in order to reduce or eliminate the need for mechanical refrigeration during some time periods.

(16) "Effective aperture" or "EA" means 1) for windows, the visible light transmittance times the window wall ratio per wall; and 2) for sky lights, the well efficiency times the visible light transmittance times the sky light area times 0.85 divided by the gross exterior roof area.

note definition is in spec. B.

(17) "Efficacy" means the ratio of light from a lamp to the electrical power consumed, including ballast losses, expressed in lumens per watt.

(18) "Emissivity" means the ratio of the rate of radiant heat energy emitted by a body at a given temperature to the rate of radiant heat energy emitted by a standard called a blackbody, at the same temperature in the same surroundings.

(19) "Exterior envelope" has the same meaning as "building envelope."

(20) "Exterior roof or ceiling" means an exterior partition, or partition separating a conditioned space from an enclosed unconditioned space, that has a slope less than 60° from horizontal, that has conditioned space below, and that is not an exterior door or skylight.

(21) "Exterior roof or ceiling area" means the area of the exterior surface of exterior roof or ceiling.

(22) "Exterior wall" means an exterior partition that is not an exterior floor or soffit, exterior door, exterior roof or ceiling, window, or skylight.

(23) "Exterior wall area" means the area of the opaque exterior surface of exterior walls.

(24) "Fenestration" means any light-transmitting section in a building wall or roof. The fenestration includes glazing material, which may be glass or plastic, framing such as mullions, muntins, and dividers, external shading devices, internal shading devices, and integral or between glass shading devices.

(25) "Fenestration area" means the total area of fenestration measured using the rough opening and including the glazing material, sash, and frame.

(26) "General lighting" means lighting designed to provide a substantially uniform level of illumination throughout an area, exclusive of any provision for special visual tasks or decorative effect. When designed for lower-than-task illuminance used in conjunction with other specific task lighting systems, it is also called "ambient" lighting.

(27) "Gross exterior wall area" means the gross area of exterior walls separating a conditioned space from the outdoors or from unconditioned spaces as measured on the exterior above grade. It consists of the opaque wall, excluding vents and grills, including between floor spandrels, peripheral edges of flooring, window areas including sash, and door areas.

(28) "Gross floor area" means the sum of the floor areas of the conditioned spaces within the building including basements, mezzanine and intermediate-floored tiers, and penthouses of headroom height 7.5 ft or greater. It is measured from the exterior faces of exterior walls or from the centerline of walls separating buildings, excluding covered walkways, open roofed-over areas, porches and similar spaces, pipe trenches, exterior terraces or steps, chimneys, roof overhangs, and similar features.

(29) "Gross floor area over outside or unconditioned spaces" means the gross area of a floor assembly separating a conditioned space from the outdoors or from unconditioned spaces as measured from the exterior faces of exterior walls or from the center line of walls separating buildings. The floor assembly shall be considered to include all floor components through which heat may flow between indoor and outdoor or unconditioned environments.

(30) "Gross lighted area" or "GLA" means the sum of the total lighted areas of a building measured from the inside of the perimeter walls for each floor of the building.

(31) "Gross roof area" means the gross area of a roof or ceiling assembly separating a conditioned space from the outdoors or from unconditioned spaces, measured from the exterior faces of exterior walls or from the centerline of walls separating buildings. The roof assembly

shall be considered to include all roof or ceiling components through which heat may flow between indoor and outdoor environments including skylights but excluding service openings.

change to APTM 26
(32) "Gross exterior roof area" means the sum of the skylight area and the exterior roof/ceiling area.

Track!!
(33) "Gross exterior wall area" means the sum of the window area, door area and exterior wall area.

(34) "Heat capacity" or "HC" means the amount of heat necessary to raise the temperature of a given mass one degree. Numerically, it is the mass multiplied by the specific heat.

exceeding
(35) "Heated space" means an enclosed space within a building that is conditioned by a heating system with an output capacity either exceeds 10 Btu/hr sq. ft. or is capable of maintaining a space dry-bulb temperature of 50°F or more at design conditions.

(36) "Heating, ventilating, and air conditioning system" or "HVAC system" means the equipment, distribution network, and terminals that provide either collectively or individually the process of heating, ventilating, or air conditioning to a building.

(37) "Indirectly conditioned space" means an enclosed space including, but not limited to, unconditioned volume in atria, that is not directly conditioned space; and either has an area-weighted heat transfer coefficient to directly conditioned space exceeding that to the outdoors or to unconditioned space, or is a space through which air from directly conditioned spaces is transferred at a rate exceeding three air changes per hour.

may not exist
(38) "Informational sign" means a sign used to give building or room identification direction or a warning for safety purposes in a building, but does not include advertising signs for product or merchandise displays.

(39) "Listed space area" or "LS" means any interior space with an identified area of activities for which a lighting power budget is calculated and listed in the lighting power allowance determination.

(40) "Lumen maintenance control device" means a device capable of automatically adjusting the light output of a lighting system throughout a continuous range to provide a preset level of illumination.

(41) "Luminaire" means a complete lighting unit consisting of at least one lamp and the parts designed to distribute the light, to position and protect the lamp, to connect the lamp to the power supply and ballasting, when applicable. Luminaires are commonly referred to as "lighting fixtures" or "instruments."

(42) "Manual" means capable of being operated by personal intervention.

(43) "Mass wall" means a wall assembly with a heat capacity (HC) greater than or equal to 5 Btu/ft² °F.

(44) "Mass wall insulation position" means:

(a) Exterior insulation position: a wall having all or nearly all of its mass exposed to the room air with the insulation on the exterior of that mass.

(b) Integral insulation position: a wall having mass exposed to both room and outside air with substantially equal amounts of mass on the inside and outside of the insulation layer.

(c) Interior insulation position: a wall not meeting either par. (a) or (b), particularly a wall having most of its mass external to an insulation layer.

(45) "Medical and clinical care" means the promotion of the condition of being sound in body or mind through medical, dental or psychological examination and treatment.

(46) "Multiscene dimming system" means a lighting control device that has the capability of setting light levels throughout a continuous range, and that has pre-established settings within the range.

(47) "Occupant-sensing device" means a device that automatically controls the lights based on occupancy.

(48) "Opaque areas" means all exposed areas of a building envelope which enclose conditioned space except fenestration areas and building service openings such as vents and grilles.

(49) "Ornamental chandeliers" means ceiling-mounted, close-to-ceiling, or suspended decorative luminaires that use glass, crystal, ornamental metals, or other decorative material and that typically are used in hotels/motels, restaurants, or churches as a significant element in the interior architecture.

(50) "Precision commercial or industrial work" means an art, craft, or manufacturing operation requiring a certain degree of refinement.

(51) "Private driveways, walkways, and parking lots" means exterior transit areas that are associated with a commercial or residential building and intended for use solely by the employees or tenants and not by the general public.

(52) "Public driveways, walkways, and parking lots" means exterior transit areas that are intended for use by the general public.

(53) "Recooling" means lowering the temperature of air that has been previously heated by a heating system.

(54) "Recovered energy" means energy utilized from an energy-using system which would otherwise be wasted or not contribute to a desired end use.

(55) "Reduced flicker operation" means the operation of a light, in which the light has a visual flicker less than 30% for frequency and modulation.

(56) "Reheating" means raising the temperature of air that has been previously cooled either by refrigeration or an economizer system.

Note: Introducing outdoor air necessary to meet ventilation requirements or to assure adequate indoor air quality is not considered to be cooling.

(57) "Reset" means adjustment of the controller set point to a higher or lower value automatically or manually.

(57m) "Residential building" means a building as defined in IECC section 201.1.

(58) "Sconce" means a wall mounted decorative light fixture.

(59) "Shading coefficient" or "SCx" means the ratio of solar heat gain through fenestration, with or without integral shading devices, to that occurring through unshaded 1/8-in. thick clear double strength glass.

(60) "Shell building" means a building for which the envelope is designed, constructed, or both prior to knowing the occupancy type.

Note: See also speculative building.

(61) "Speculative building" means a building for which the envelope is designed, constructed, or both prior to the design of the lighting, HVAC systems, or both. A speculative building differs from a shell building in that the intended occupancy is known for the speculative building.

Note: See also shell building.

(62) "Support area" means an area for functions that are different from but necessary to accomplish the main activity or purpose of other listed space areas.

(63) "Tandem wiring" means pairs of luminaires operating with one lamp in each luminaire powered from a single two-lamp ballast contained in the other luminaires.

(64) "Task oriented lighting" means lighting that is designed specifically to illuminate a task location, and that is generally confined to the task location.

(65) "Thermal break" means an element of low thermal conductivity placed in an assembly to reduce the flow of heat between highly conductive materials.

(66) "Thermal conductance" or "C" means the constant time rate of heat flow through a unit area of a body induced by a unit temperature difference between the surfaces, expressed in Btu/h . ft 2°F or equivalent units. It is the reciprocal of thermal resistance.

(67) "Thermal resistance" or "R" means the reciprocal of thermal conductance, $1/C$ expressed in h . ft $2^{\circ}\text{F}/\text{Btu}$ or equivalent units. The total thermal resistance of an assembly is $1/U_o$.

(68) "Thermal transmittance" or "U" means the overall coefficient of heat transfer from fluid to fluid. It is the time rate of heat flow per unit area under steady conditions from the fluid on the warm side of the barrier to the fluid on the cold side, per unit temperature difference between the 2 fluids, expressed in Btu/h . ft 2°F or equivalent units.

(69) "Thermal transmittance, overall" or " U_o " means the gross overall (area weighted average) coefficient of heat transfer from air to air or fluid to fluid for a gross area of the building envelope, expressed in Btu/h . ft 2°F or equivalent units. The U_o value applies to the combined effect of the time rate of heat flows through the various parallel paths such as windows, doors, and opaque construction areas comprising the gross area of one or more building envelope components such as walls, floors, and roof or ceiling.

(70) "Thermostat" means an automatic control device responsive to temperature.

(71) "Throw distance" means the distance between the luminaire and the center of the plane on a subject lit by the luminaire.

(72) "Unconditioned space" means a space within a building that is not a conditioned space.

Note: See conditioned space.

(73) "Unlisted space" means the difference in area between the gross lighted area and the sum of all listed space areas.

(74) "Variable air volume HVAC system" or "VAV HVAC system" means HVAC systems that control the dry-bulb temperature within a space by varying the volume of air supply to the space.

(75) "Visible light transmittance" or "VLT" means the ratio expressed as a decimal of visible light that is transmitted through a glazing material to the light that strikes the material.

(76) "Wall heat capacity" or "HC" means the sum of products of the mass of each individual material in the wall per unit area of wall surface times its individual specific heat, Btu/(ft 2°F). (unc?)

(77) "Well efficiency" means the ratio of the amount of visible light leaving a skylight well to the amount of visible light entering the skylight well and is calculated as follows:

(a) for rectangular wells:

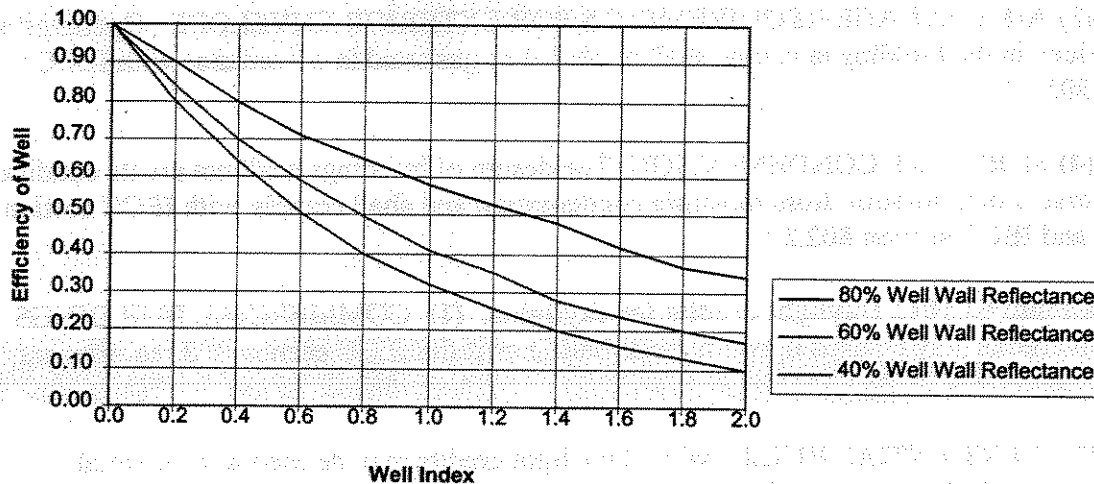
$$\frac{\text{Well height (well length + well width)}}{2 \times \text{well length} \times \text{well width}} = \text{the well index} \quad ; \text{ or}$$

(b) for irregular shaped wells:

$$\frac{\text{Well height} \times \text{well perimeter}}{4 \times \text{well area}} = \text{the well index}$$

(c) The length, width, perimeter, and area expressed in pars. (a) and (b) are measured at the bottom of the well. The well index and the weighted average well wall reflectance are used in Figure 63.1005 to determine the well efficiency.

Figure 63.1005 Well Efficiency



Information taken from: Fig 7-38, IES Lighting Handbook, 1984 Reference

(78) "Window" means glazing that is not a skylight.

(79) "Window area" means the area of the surface of a window, plus the area of the frame, sash, and mullions.

(80) "Window wall ratio" means the ratio of the window area, including glazed areas of doors, to the gross exterior wall area.

(81) "Zone" means a space or group of spaces within a building with any combination of heating, cooling, or lighting requirements sufficiently similar so that desired conditions can be maintained throughout by a single controlling device.



Part 3 — Building Envelope

Comm 63.1010 Exempt buildings. This part applies to buildings or separately enclosed identifiable areas that have a mechanical space heating or air conditioning system.

Comm 63.1011 Air leakage and moisture migration. (1) GENERAL. The requirements of this section apply to those building components that separate interior building conditioned space from the outdoors or from unconditioned spaces or crawl spaces. Compliance with the criteria for air leakage through building components shall be determined by tests conducted in accordance with specified standards.

(2) AIR LEAKAGE FOR FACTORY MANUFACTURED WINDOWS, DOORS AND CURTAIN WALL ASSEMBLIES. Factory manufactured windows, doors and curtain wall assemblies shall comply with IECC section 802.3.1.

(3) AIR LEAKAGE REQUIREMENTS FOR EXTERIOR ENVELOPE. Openings and penetrations in the building envelope shall be sealed or gasketed in accordance with IECC section 802.3.2.

(4) MOISTURE CONDENSATION. The design of buildings shall not create conditions of accelerated deterioration from moisture condensation and shall comply with IECC section 802.1.2 and IECC section 802.2.1.

Comm 63.1012 Daylight credits for skylights. (1) COMMERCIAL BUILDINGS. Day light credits may be used in commercial buildings if the IECC section 802 requirements are met.

What is the definition?
(2) RESIDENTIAL BUILDINGS. Day light credits may be used in residential buildings if the IECC section 502.1.2 requirements are met.

Comm 63.1014 Building envelope thermal performance. (1) Except as provided in subs. (2) and (3), building envelopes shall comply with either the component standards of s. Comm 63.1015 or the system standards of s. Comm 63.1016. The calculation procedures of s. Comm 63.1019 shall be used to show compliance.

(2) Buildings and areas of buildings that are used as factories and automatic car washes shall comply with s. Comm 63.1017.

(3) Buildings and areas of buildings that are used as warehouses that have documentation provided to verify that the HVAC system to be installed does not use energy primarily to provide human comfort shall comply with s. Comm 63.1017.

Note: See s. Comm 63.1010 for exempt buildings and spaces.

Comm 63.1015 Component standards option. This section describes the component standards for building envelope thermal performance. Because component requirements consider the effect of solar gain as well as conductive heat transfer, the requirements for each component shall be met independently under this option. The wall and roof trade-off exception in sub. (3) may be used with this option. The System Analysis Design Method of Subchapter III shall be used to demonstrate the acceptability of trade-offs between component energy-conserving features. Separate occupancies in the same building shall meet the requirements of this section independently.

(1) **DETERMINATION OF APPROPRIATE ACP TABLE.** The appropriate alternate component package or ACP table shall be determined based on building location using Figure 63.1015.

(2) **MAXIMUM ALLOWABLE WINDOW WALL RATIO.** The percentage of windows, including glazed areas of doors, relative to the gross exterior wall area of the building shall be less than or equal to the maximum allowable window wall ratio chosen from the appropriate ACP table for the glazing type of the building. The window wall ratio is the total area of window assemblies, including glazed areas of doors, divided by the total gross exterior wall area, considering all elevations of the building. The maximum allowable window wall ratio shall be determined using the following steps:

(a) Select the Shading Coefficient (SCx) range that is no less than the fenestration SCx including permanently installed internal, integral and external shading devices, but excluding the effect of external shading projections. Note that this includes curtains, shades, or blinds that are permanently installed. For a shell or speculative building for which the envelope is designed or constructed prior to the design of the lighting, HVAC systems, or both, only those shading devices that are part of the design when it is being evaluated for compliance shall be considered when determining compliance.

Note: Refer to ASHRAE Handbook, Fundamentals Volume, Chapter 27 for more information on shading coefficients. Shading coefficients for fenestration are obtained from the manufacturer. See also s. Comm 63.1019 (4).

(b) Select appropriate fenestration type. This is determined by the thermal transmittance value (Uof) of the fenestration assembly. The Uof of all assemblies must fall within the range, or lower, to determine the maximum window wall ratio, or an area-weighted average thermal transmittance value may be used.

(3) **WALL AND ROOF TRADE-OFF.** Trade-offs between the above grade exterior wall opaque areas and the gross roof area shall be allowed if either of the following conditions are met:

(a) 1. Except as specified in subd. 2., the thermal transmittance, overall value (Uo) for any above grade exterior opaque wall area or gross roof area may be increased or decreased, provided that the total annual energy use due to heat gain and loss for the building envelope shall be less than or equal to the total annual energy use due to heat gain and loss resulting from the use of the values in the appropriate ACP table given in Figure 63.1015.

2. The latest version of the ENVSTD computer program may be used to determine required thermal transmittance values in lieu of the ACP tables. ENVSTD is the computer program included in the ASHRAE Standard 90.1.

(b) A submittal to the department for review and approval, incorporating recognized engineering practices, that the annual energy use due to heat gain and loss for the building envelope shall be less than or equal to that established in par (a).

(4) THERMAL TRANSMITTANCE VALUES FOR ROOFS, WALLS NEXT TO UNCONDITIONED SPACES, AND FLOORS OVER UNCONDITIONED SPACES. (a) The U-values for the building roofs, walls next to unconditioned spaces, and floors over unconditioned spaces shall be less than or equal to those listed in the appropriate ACP table given in Figure 63.1015.

(b) Skylights for which daylight credit cannot be taken in accordance with s. Comm 63.1012 shall be included in the calculation of the overall thermal transmittance value of the roof assembly (U_{or}).

(c) Unconditioned below-grade spaces that have floor or ceiling assemblies insulated as specified on the appropriate ACP table do not require below-grade wall insulation.

(5) THERMAL RESISTANCE VALUE FOR SLAB-ON-GRADE FLOORS. (a) Unheated slab-on-grade floors shall have insulation around the perimeter of the floor with the thermal resistance (R_u) of the insulation as listed in the appropriate ACP table.

(b) For heated slabs-on-grade, the required minimum R-value shall be the R-value for the unheated slab-on-grade plus 2.0.

(c) The slab insulation specified shall extend either in a vertical plane downward from the top of the slab for the minimum distance given in the appropriate ACP table or downward to the bottom of the slab then in a horizontal plane beneath the slab or outward from the building for the minimum distance given in the ACP table. Vertical insulation shall not be required to extend below the foundation footing.

(d) The R-value and dimensions required for slabs refer only to the building insulation materials. Insulative continuity shall be maintained in the design of slab edge insulation systems. Continuity shall be maintained from the wall insulation through the intersection of the slab, wall and footing to the body of the slab edge insulation.

Figure 63.1015
Degree Day Regions

REGIONS	ACP TABLE
1,2,4	A
3,5,6,7,8	B
9,10,11	C

Figure 63.1015



Figure 63.1015 (Continued)
Alternate Component Package
ACP Table A

Part A1: Maximum Window Area / Gross Exterior Wall Area						
Exterior Wall U_o	Shading Coefficient Range SC_x	U_o Range				
		0.60 to 0.56	0.55 to 0.51	0.50 to 0.46	0.45 to 0.41	≤ 0.40
≤ 0.06	0.80 - 0.71	0.20	0.21	0.23	0.25	0.27
	0.70 - 0.61	0.20	0.22	0.24	0.26	0.28
	0.60 - 0.51	0.21	0.22	0.25	0.27	0.30
	0.50 - 0.41	0.21	0.23	0.25	0.28	0.31
	≤ 0.40	0.21	0.23	0.26	0.29	0.33
0.061 to 0.070	0.80 - 0.71	0.18	0.20	0.21	0.23	0.25
	0.70 - 0.61	0.18	0.20	0.22	0.24	0.27
	0.60 - 0.51	0.19	0.21	0.23	0.25	0.28
	0.50 - 0.41	0.19	0.21	0.23	0.26	0.30
	≤ 0.40	0.19	0.21	0.24	0.27	0.31
0.071 to 0.080	0.80 - 0.71	0.16	0.18	0.20	0.22	0.24
	0.70 - 0.61	0.17	0.18	0.20	0.23	0.25
	0.60 - 0.51	0.17	0.19	0.21	0.23	0.26
	0.50 - 0.41	0.17	0.19	0.21	0.24	0.27
	≤ 0.40	0.18	0.19	0.22	0.25	0.28
0.081 to 0.090	0.80 - 0.71	0.15	0.16	0.18	0.20	0.22
	0.70 - 0.61	0.15	0.17	0.18	0.21	0.23
	0.60 - 0.51	0.15	0.17	0.19	0.21	0.24
	0.50 - 0.41	0.16	0.17	0.19	0.22	0.25
	≤ 0.40	0.16	0.17	0.20	0.22	0.26

Part A2: Other Criteria
Roof Max $U_o = 0.040$
Wall Adjacent to Unconditioned Space Max $U_o = 0.10$
Floor Over Unconditioned Space Max $U_o = 0.040$
Wall Below Grade Min R-Value = 13

Part A3: Unheated Slab-On-Grade Minimum R-Value			
Insulation	Length of Insulation		
Orientation	24"	36"	48"
Horizontal	R=18	R=15	R=11
Vertical	R=8	R=6	R=4

Figure 63.1015 (Continued)
Alternate Component Package
ACP Table B

Part B1: Maximum Window Area / Gross Exterior Wall Area						
Exterior Wall U_o	Shading Coefficient Range SC_x	U_{or} Range				
		0.60 to 0.56	0.55 to 0.51	0.50 to 0.46	0.45 to 0.41	≤ 0.40
≤ 0.06	0.80 - 0.71	0.20	0.21	0.22	0.23	0.24
	0.70 - 0.61	0.21	0.22	0.24	0.25	0.27
	0.60 - 0.51	0.22	0.24	0.25	0.27	0.29
	0.50 - 0.41	0.24	0.25	0.27	0.30	0.32
	≤ 0.40	0.25	0.27	0.29	0.32	0.35
0.061 to 0.070	0.80 - 0.71	0.19	0.20	0.21	0.22	0.23
	0.70 - 0.61	0.20	0.21	0.22	0.24	0.25
	0.60 - 0.51	0.21	0.23	0.24	0.26	0.28
	0.50 - 0.41	0.22	0.24	0.26	0.28	0.31
	≤ 0.40	0.24	0.26	0.28	0.31	0.34
0.071 to 0.080	0.80 - 0.71	0.18	0.19	0.20	0.21	0.23
	0.70 - 0.61	0.19	0.20	0.21	0.23	0.24
	0.60 - 0.51	0.20	0.21	0.23	0.25	0.27
	0.50 - 0.41	0.21	0.23	0.25	0.27	0.29
	≤ 0.40	0.22	0.24	0.27	0.29	0.32
0.081 to 0.090	0.80 - 0.71	0.17	0.18	0.19	0.20	0.21
	0.70 - 0.61	0.18	0.19	0.20	0.21	0.23
	0.60 - 0.51	0.19	0.20	0.21	0.23	0.25
	0.50 - 0.41	0.20	0.21	0.23	0.25	0.28
	≤ 0.40	0.21	0.23	0.25	0.27	0.30

Part B2: Other Criteria
Roof Max $U_o = 0.045$
Wall Adjacent to Unconditioned Space Max $U_o = 0.11$
Floor Over Unconditioned Space Max $U_o = 0.040$
Wall Below Grade Min R-Value = 12

Part B3: Unheated Slab-On-Grade Minimum R-Value			
Insulation	Length of Insulation		
Orientation	24"	36"	48"
Horizontal	R=18	R=15	R=11
Vertical	R=8	R=6	R=4

Figure 63.1015 (Continued)
Alternate Component Package
ACP Table C

Part C1: Maximum Window Area / Gross Exterior Wall Area						
Exterior Wall U_o	Shading Coefficient Range SC_x	U_{of} Range				
		0.60 to 0.56	0.55 to 0.51	0.50 to 0.46	0.45 to 0.41	≤ 0.40
≤ 0.06	0.80 - 0.71	0.20	0.21	0.22	0.22	0.23
	0.70 - 0.61	0.22	0.23	0.24	0.25	0.26
	0.60 - 0.51	0.23	0.25	0.26	0.27	0.29
	0.50 - 0.41	0.25	0.27	0.29	0.30	0.32
	≤ 0.40	0.27	0.29	0.32	0.34	0.37
0.061 to 0.070	0.80 - 0.71	0.19	0.20	0.21	0.22	0.23
	0.70 - 0.61	0.21	0.22	0.23	0.24	0.25
	0.60 - 0.51	0.22	0.24	0.25	0.26	0.28
	0.50 - 0.41	0.24	0.26	0.27	0.29	0.31
	≤ 0.40	0.26	0.28	0.30	0.33	0.35
0.071 to 0.080	0.80 - 0.71	0.18	0.19	0.20	0.21	0.22
	0.70 - 0.61	0.20	0.21	0.22	0.23	0.24
	0.60 - 0.51	0.21	0.23	0.25	0.26	0.27
	0.50 - 0.41	0.23	0.25	0.26	0.28	0.30
	≤ 0.40	0.25	0.27	0.29	0.31	0.34
0.081 to 0.090	0.80 - 0.71	0.17	0.18	0.19	0.20	0.21
	0.70 - 0.61	0.19	0.20	0.21	0.22	0.23
	0.60 - 0.51	0.20	0.22	0.23	0.24	0.26
	0.50 - 0.41	0.22	0.23	0.25	0.27	0.29
	≤ 0.40	0.24	0.26	0.28	0.30	0.33

Part C2: Other Criteria
Roof Max $U_o = 0.049$
Wall Adjacent to Unconditioned Space Max $U_o = 0.11$
Floor Over Unconditioned Space Max $U_o = 0.040$
Wall Below Grade Min R-Value = 11

Part C3: Unheated Slab-On-Grade Minimum R-Value			
Insulation	Length of Insulation		
Orientation	24"	36"	48"
Horizontal	R=18	R=15	R=11
Vertical	R=8	R=6	R=4

Comm 63.1016 System standards option. To comply with the system standards for building envelope thermal performance, the building shall comply with section 8.6 of ASHRAE standard 90.1 or with the system analysis design specified in IECC chapter 4 applied to the thermal envelope alone. Building site climate data shall be determined using Wisconsin division of state energy statistics or other source acceptable to the department.

Note: Section 8.6 of ASHRAE 90.1 requires use of the latest version of the ENVSTD computer program. ENVSTD is the computer program included in the ASHRAE 90.1 Standard.

Note: ComCheck-EZ is a computer program that may be used only for determining building envelope compliance. A computer package called ComCheck-Plus has been issued by the Department of Energy, which establishes trade-offs between the building envelope, lighting, and HVAC equipment. This program has not been approved for use in Wisconsin since Wisconsin's lighting allowances do not meet those included in the program.

Comm 63.1017 Design criteria. (1) THERMAL PERFORMANCE. (a) Except as provided in par. (b), the thermal performance values for the exterior envelope of buildings or areas of buildings that are warehouses that meet the criteria of s. Comm 63.1014 (3), or that are factories shall not exceed the values in Table 63.1017-1. The calculation procedures of s. Comm 63.1019 shall be used to show compliance.

Table 63.1017-1
Thermal Performance Values

Number of Stories	Thermal Performance Values*
1-2	12
3-4	13
5-7	16
8-12	18
13-20	20
Over 20	21

*Expressed in Btu/hour/square foot of above-grade exterior envelope. See s. Comm 63.1023 (2) and (3) for design conditions.

(b) The thermal performance values specified in par. (a) may be increased or decreased provided the U-value for other components is decreased or increased so the total heat gain or loss for the entire building envelope and floor area does not exceed the total heat gain or loss resulting from conformance to the values specified in this section.

(2) FLOORS OVER UNCONDITIONED SPACES. The overall heat transmission coefficient (U-value) for floors of heated or mechanically cooled spaces over unconditioned spaces shall not exceed 0.08 Btu/F. Sq. Ft. hour.

(3) SLAB-ON-GRADE PERIMETER INSULATION. For slab-on-grade floors with or without a grade beam, a foundation bearing wall or a foundation frost wall, the thermal resistance of the insulation around the perimeter of the floor shall not be less than the values shown in Table 63.10165-2. The insulation shall extend 48 inches in the vertical or horizontal direction or combination thereof with a total dimension of 48 inches. Slab-on grade perimeter insulation shall be moisture resistant.

Table 63.1017-2
Perimeter Insulation Requirements¹

Slab-on-grade Perimeter Insulation		Zone 1	Zone 2	Zone 3	Zone 4
R = $\frac{^{\circ}\text{F Sq. Ft. Hour}}{\text{Btu}}$	Unheated Slabs	6.7	6.2	5.9	5.2
	Heated Slabs ²	9.3	9.0	8.6	8.2

¹ See Fig. 63.1023 for zone definitions.

² Heated slabs have piping, duct work or other heat distribution system components embedded in or under them.

Comm 63.1018 Material properties. (1) ASHRAE FUNDAMENTAL DATA. Except as specified in par. (2), when available, information on thermal properties, performance of building envelope sections, and components and heat transfer shall be obtained from ASHRAE Handbook of Fundamentals.

(2) EXCEPTIONS. (a) When the information is not available from ASHRAE Handbook of Fundamentals, the data may be obtained from or laboratory or field-test measurements. If laboratory or field test measurements are used for envelope heat transmission, they shall be obtained using one of the following test methods:

1. GUARDED HOT PLATE: ASTM C 177;
2. HEAT FLOW METER: ASTM C 518;
3. GUARDED HOT BOX: ASTM C 236;
4. CALIBRATED HOT BOX: ASTM C 976; or
5. PIPE INSULATION: ASTM C 335.

(b) For foam plastic insulations that use a gas other than air as the insulating medium, laboratory or field tests shall be conducted on representative samples that have been aged for the equivalent of 5 years or until the R-Value has stabilized. The tests shall be conducted by an independent third party and shall be submitted for department product review and approval in accordance with ch. Comm 61.

(c) Integrally insulated concrete masonry systems evaluated by the National Concrete Masonry Association (NCMA) shall be evaluated for the thermal performance of the masonry or concrete units in accordance with the NCMA Evaluation Procedures for the Integrally-Insulated Concrete Masonry Walls. All other concrete or masonry units not evaluated by the NCMA Evaluation Procedures shall comply with one of the following methods for determining the thermal performance of the assembly or system.

1. Use default values specified in Comm Table A63.1015-2. No extrapolations or interpolations are allowed.

2. Use of the ASTM C976 Hotbox Test Method.
3. Verify thermal performance through a laboratory or field test measurements specified in par (a).
4. Use the department material approval process as specified in ch. Comm 61 to determine the U-factor.

Comm 63.1019 Required calculation procedures. The following procedures shall be used to calculate the thermal performance of above- and below-grade envelope sections of any building that is heated or mechanically cooled.

(1) OVERALL THERMAL TRANSMITTANCE (U_o). The overall thermal transmittance of the building envelope assembly shall be calculated in accordance with the following equation:

$$U_o = \sum U_i A_i / A_o = (U_1 A_1 + U_2 A_2 + \dots + U_n A_n) / A_o$$

where:

U_o = The area-weighted average thermal transmittance of the gross area of an envelope assembly; that is the exterior wall assembly including fenestration and doors, the roof and ceiling assembly, and the floor assembly, Btu/hft² °F.

A_o = The gross area of the envelope assembly, ft².

U_i = The thermal transmittance of each individual path of the envelope assembly, for example, the opaque portion of the wall assembly, Btu/hft² °F. U_i also equals $1/R_i$ where R_i is the total resistance to heat flow of an individual path through an envelope assembly.

A_i = The area of each individual element of the envelope assembly, ft².

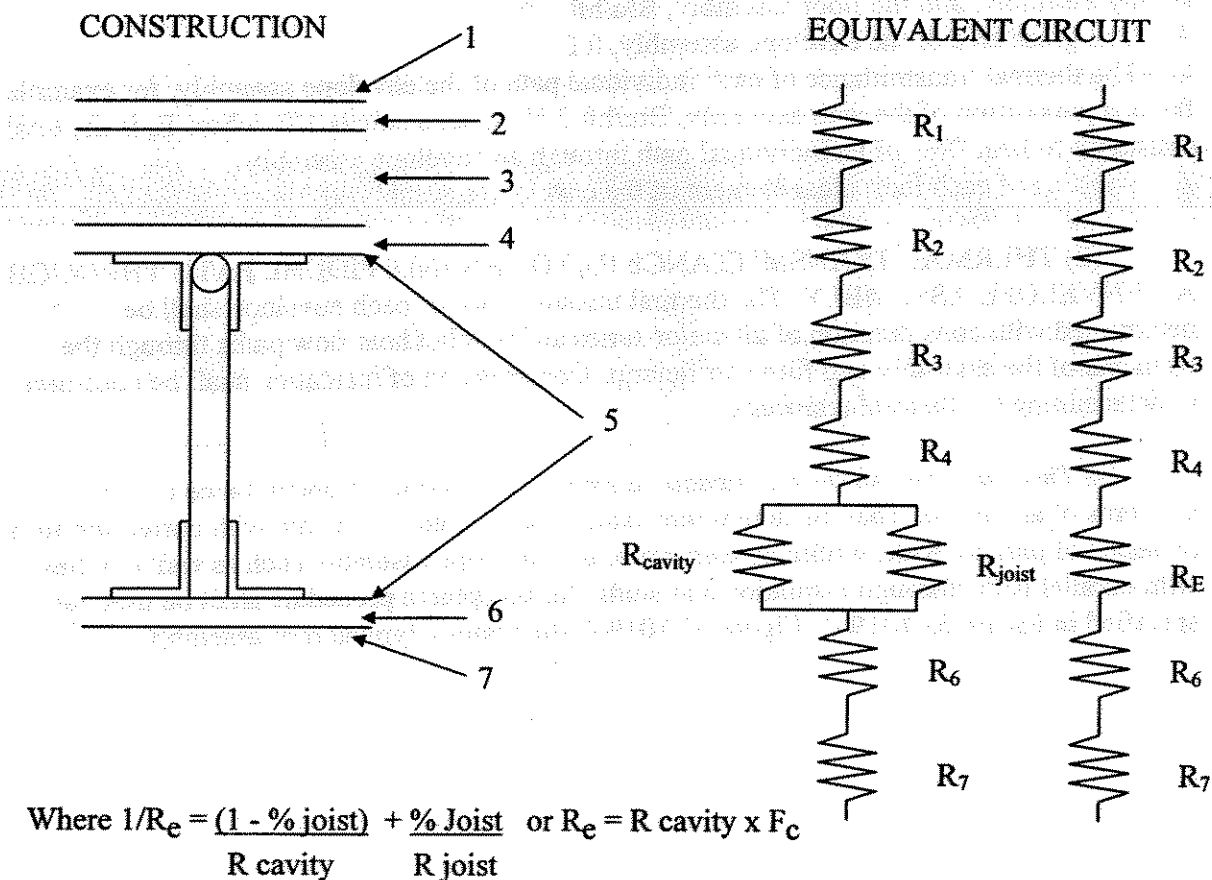
(2) THERMAL TRANSMITTANCE (U_i) OF AN INDIVIDUAL PATH THROUGH AN ENVELOPE ASSEMBLY. The thermal transmittance of each envelope shall be determined with consideration of all major series and parallel heat flow paths through the elements of the assembly and film coefficients. Compression of insulation shall be considered in determining the thermal resistance.

(a) Thermal transmittance of opaque elements. The thermal transmittance of opaque elements of assemblies shall be determined using a series path procedure with correction for the presence of parallel paths within an element of the envelope assembly such as wall cavities with parallel paths through insulation and studs. An acceptable procedure shall be used, as specified in Figure 63.1019-1. Figure 63.1019-2 illustrates a typical roof assembly.

Figure 63.1019-1 Calculation Procedures for Evaluating Major Series and Parallel Heat Flow Paths

Acceptable Procedures for Determining U_i for Opaque Elements		
Sheathing	Framing	
	Metal	Nonmetal
Metal on One or Both Sides	Tests - s. Comm 63.1019 (2)(a) 1.a. Thermal Bridges - s. Comm 63.1019 (2)(a) 1.c.	Tests - s. Comm 63.1019 (2)(a) 1.a. Series or Parallel Path - s. Comm 63.1019 (2)(a) 2.
Nonmetal on Both Sides	Tests - s. Comm 63.1019 (2)(a) 1.a. Parallel Path Correction Factor - s. Comm 63.1019 (2)(a) 1.b. Zone Method - s. Comm 63.1019 (2)(a) 1.d.	Tests - s. Comm 63.1019 (2)(a) 1.a. Series or Parallel Path - s. Comm 63.1019 (2)(a) 2.

Figure 63.1019-2 Calculation Procedure for Thermal Resistance of a Typical Roof Assembly



R_e is the equivalent resistance of the element contacting the parallel path. F_c is the parallel path correction factor.

1. For envelope assemblies containing metal framing, the U_i shall be determined by using one of the following methods:

a. Results from laboratory or field test measurements. One of the procedures specified in s. Comm 63.1018 shall be used.

b. The thermal resistance of those roof and wall assemblies listed in Tables 63.1019-1 and 63.1019-2 shall be corrected using the following parallel path correction factor procedure:

Considering the total resistance of the series path:

$$U_i = 1/R_t$$

$$R_t = R_i + R_e$$

where:

R_t = The total resistance of the envelope assembly.

R_i = The resistance of the series elements (for $i = 1$ to n) excluding the parallel path element(s)

R_e = The equivalent resistance of the element containing the parallel path, the value of R_e is:

$$R_e = R\text{-value of insulation} \times F_c$$

The Parallel Path Correction Factors (F_c) may be obtained from tests conducted using procedures listed in s. Comm 63.1018. Parallel Path Correction Factors for some envelope assemblies are listed in Tables 63.1019-1 and 63.1019-2.

c. For elements with internal metallic structures bonded on one or both sides to a metal skin or covering, the calculation procedure specified in the ASHRAE Handbook of Fundamentals, or specified in ASHRAE 90.1, or other procedure acceptable to the department shall be used to include the effects of thermal bridges in metal construction.

d. For elements other than those covered above, the zone method described in the ASHRAE Handbook of Fundamentals Volume shall be used for calculation.

Table 63.1019-1

Roofs
Parallel Path Correction Factors^a

Bridged R-Value	0	5	10	15	20	25	30	35	40	45	50	55
Correction Factor	1.0	0.96	0.92	0.88	0.85	0.81	0.79	0.76	0.73	0.71	0.69	0.67

^a Table values are based upon metal trusses with 4-foot spacing that penetrate the insulation, and 0.66-inch diameter cross members every 1 foot.

Table 63.1019-2

Wall Sections With Metal Studs
Parallel Path Correction Factors

Size of Members	Gauge of Stud ^a	Spacing of Framing, in.	Cavity Insulation R-Value	Correction Factor	Effective Framing/Cavity R-Values
2 x 4	18-16	16 o.c.	R-11	0.50	R-5.5
			R-13	0.46	R-6.0
			R-15	0.43	R-6.4
2 x 4	18-16	24 o.c.	R-11	0.60	R-6.6
			R-13	0.55	R-7.2
			R-15	0.52	R-7.8
2 x 6	18-16	16 o.c.	R-19	0.37	R-7.1
			R-21	0.35	R-7.4
2 x 6	18-16	24 o.c.	R-19	0.45	R-8.6
			R-21	0.43	R-9.0
2 x 8	18-16	16 o.c.	R-25	0.31	R-7.8
2 x 8	18-16	24 o.c.	R-25	0.38	R-9.6

^a These factors can be applied to metal studs of this gauge or thinner.

2. For assemblies containing nonmetal framing, the U_i shall be determined from one of the laboratory or field test measurements specified in s. Comm 63.1018 or from the ASHRAE series-parallel method. Formulas in the ASHRAE Handbook of Fundamentals, shall be used for these calculations.

3. The opaque portions of doors shall be considered to be a part of the opaque wall assembly in the calculation of the average thermal transmittance. The thermal transmittance of the entire opaque door assembly including the frame shall be included in the calculation.

Note: See Appendix A for sample U -values for doors and explanatory information.

2. The values for the appropriate product type given in Table 63.1019-3 may be used.

Note: Interpolation between tables for glazing other than 0°, 45° and 90° is acceptable.

Note: In order to use the component standards option of s. Comm 63.1015, the U-value of fenestration 0.60 or less.

Table 63.1019-3, Part 1
Window U-Values

Glazing Type	Aluminum Frame-- no thermal break*	Aluminum Frame-- Thermal break*	Wood or Vinyl Frame
Single glazing			
Glass	1.23	1.10	0.98
1/8 in. acrylic	1.16	1.03	0.92
Double glass, air filled			
1/4 in. air space	0.78	0.65	0.55
3/8 in. air space	0.74	0.60	0.51
1/2 in. and greater	0.72	0.59	0.49
Double glass, low emissivity = 0.4 on surface 2 or 3			
1/4 in. air space	0.73	0.59	0.50
3/8 in. air space	0.67	0.54	0.45
1/2 in. and greater	0.65	0.52	0.42
Double glass, low emissivity = 0.15 on surface 2 or 3			
1/4 in. air space	0.68	0.55	0.46
3/8 in. air space	0.62	0.48	0.39
1/2 in. and greater	0.60	0.46	0.37
Double glass, argon filled			
1/4 in. argon space	0.74	0.61	0.51
3/8 in. argon space	0.71	0.57	0.48
1/2 in. and greater	0.69	0.56	0.47
Double glass, low emissivity = 0.4 on surface 2 or 3, argon filled			
1/4 in. argon space	0.67	0.54	0.45
3/8 in. argon space	0.63	0.49	0.40
1/2 in. and greater	0.62	0.48	0.39
Double glass, low emissivity = 0.15 on surface 2 or 3, argon filled			
1/4 in. argon space	0.62	0.48	0.39
3/8 in. argon space	0.57	0.43	0.34
1/2 in. and greater	0.55	0.42	0.33
Double glazing, 1/8 in. acrylic or polycarbonate			
1/4 in. air space	0.74	0.61	0.51
3/8 in. air space	0.71	0.57	0.48
1/2 in. and greater	0.69	0.56	0.47
Double glazing, 1/4 in. acrylic or polycarbonate			
1/4 in. air space	0.71	0.57	0.48
3/8 in. air space	0.68	0.54	0.45
1/2 in. and greater	0.66	0.53	0.43
Triple glass			
1/4 in. air space	0.64	0.50	0.41
3/8 in. air space	0.60	0.46	0.38
1/2 in. and greater	0.58	0.45	0.36
Triple glass or double glass with polyester film suspended in between, low emissivity = 0.15 on surface 2, 3, 4, or 5			
1/4 in. air space	0.59	0.45	0.37
3/8 in. air space	0.54	0.41	0.32
1/2 in. and greater	0.52	0.39	0.30
Triple glass, argon filled			
1/4 in. argon space	0.60	0.46	0.38
3/8 in. argon space	0.57	0.44	0.35
1/2 in. and greater	0.56	0.42	0.34
Triple glass or double glass with polyester film suspended in between, low emissivity = 0.15 on surface 2, 3, 4, or 5			
1/4 in. argon space	0.54	0.41	0.32
3/8 in. argon space	0.51	0.37	0.29
1/2 in. and greater	0.50	0.36	0.28

Table 63.1019-3, Part II
Skylight U-Values - 45 Degree Slope

Glazing Type	Aluminum Frame-- no thermal break*	Aluminum Frame-- Thermal break*	Wood or Vinyl Frame
Single glazing			
Glass	1.36	1.22	1.09
1/8 in. acrylic	1.29	1.14	1.02
Double glass, air filled			
1/4 in. air space	0.88	0.74	0.63
3/8 in. air space	0.83	0.68	0.58
1/2 in. and greater	0.81	0.67	0.56
Double glass, low emissivity = 0.4 on surface 2 or 3			
1/4 in. air space	0.82	0.67	0.57
3/8 in. air space	0.76	0.61	0.52
1/2 in. and greater	0.74	0.59	0.49
Double glass, low emissivity = 0.15 on surface 2 or 3			
1/4 in. air space	0.77	0.63	0.53
3/8 in. air space	0.70	0.55	0.46
1/2 in. and greater	0.68	0.53	0.44
Double glass, argon filled			
1/4 in. argon space	0.83	0.69	0.58
3/8 in. argon space	0.80	0.65	0.55
1/2 in. and greater	0.78	0.64	0.54
Double glass, low emissivity = 0.4 on surface 2 or 3, argon filled			
1/4 in. argon space	0.76	0.61	0.52
3/8 in. argon space	0.71	0.56	0.47
1/2 in. and greater	0.70	0.55	0.46
Double glass, low emissivity = 0.15 on surface 2 or 3, argon filled			
1/4 in. argon space	0.70	0.55	0.46
3/8 in. argon space	0.65	0.50	0.40
1/2 in. and greater	0.63	0.49	0.39
Double glazing, 1/8 in. acrylic or polycarbonate			
1/4 in. air space	0.83	0.69	0.58
3/8 in. air space	0.80	0.65	0.55
1/2 in. and greater	0.78	0.64	0.54
Double glazing, 1/4 in. acrylic or polycarbonate			
1/4 in. air space	0.80	0.65	0.55
3/8 in. air space	0.77	0.61	0.52
1/2 in. and greater	0.75	0.60	0.50
Triple glass			
1/4 in. air space	0.72	0.57	0.48
3/8 in. air space	0.68	0.53	0.45
1/2 in. and greater	0.66	0.52	0.43
Triple glass or double glass with polyester film suspended in between, low emissivity = 0.15 on surface 2, 3, 4, or 5			
1/4 in. air space	0.67	0.52	0.44
3/8 in. air space	0.61	0.48	0.38
1/2 in. and greater	0.59	0.46	0.36
Triple glass, argon filled			
1/4 in. argon space	0.68	0.53	0.45
3/8 in. argon space	0.65	0.51	0.42
1/2 in. and greater	0.64	0.49	0.40
Triple glass or double glass with polyester film suspended in between, low emissivity = 0.15 on surface 2, 3, 4, or 5			
1/4 in. argon space	0.61	0.48	0.38
3/8 in. argon space	0.58	0.44	0.35
1/2 in. and greater	0.57	0.43	0.34

Table 63.1019-3, Part III
Skylight U-Values - Horizontal

Glazing Type	Aluminum Frame-- no thermal break*	Aluminum Frame-- Thermal break*	Wood or Vinyl Frame
Single glazing			
Glass	1.38	1.25	1.12
1/8 in. acrylic	1.31	1.17	1.06
Double glass, air filled			
1/4 in. air space	0.91	0.77	0.67
3/8 in. air space	0.86	0.72	0.62
1/2 in. and greater	0.84	0.71	0.60
Double glass, low emissivity = 0.4 on surface 2 or 3			
1/4 in. air space	0.85	0.71	0.61
3/8 in. air space	0.79	0.65	0.56
1/2 in. and greater	0.77	0.63	0.53
Double glass, low emissivity = 0.15 on surface 2 or 3			
1/4 in. air space	0.80	0.67	0.57
3/8 in. air space	0.74	0.59	0.50
1/2 in. and greater	0.72	0.57	0.48
Double glass, argon filled			
1/4 in. argon space	0.86	0.73	0.62
3/8 in. argon space	0.83	0.69	0.59
1/2 in. and greater	0.81	0.68	0.58
Double glass, low emissivity = 0.4 on surface 2 or 3, argon filled			
1/4 in. argon space	0.79	0.65	0.56
3/8 in. argon space	0.75	0.60	0.51
1/2 in. and greater	0.74	0.59	0.50
Double glass, low emissivity = 0.15 on surface 2 or 3, argon filled			
1/4 in. argon space	0.74	0.59	0.50
3/8 in. argon space	0.69	0.54	0.44
1/2 in. and greater	0.67	0.53	0.43
Double glazing, 1/8 in. acrylic or polycarbonate			
1/4 in. air space	0.86	0.73	0.62
3/8 in. air space	0.83	0.69	0.59
1/2 in. and greater	0.81	0.68	0.58
Double glazing, 1/4 in. acrylic or polycarbonate			
1/4 in. air space	0.83	0.69	0.59
3/8 in. air space	0.80	0.65	0.56
1/2 in. and greater	0.78	0.64	0.54
Triple glass			
1/4 in. air space	0.76	0.61	0.52
3/8 in. air space	0.72	0.57	0.49
1/2 in. and greater	0.70	0.56	0.47
Triple glass or double glass with polyester film suspended in between, low emissivity = 0.15 on surface 2, 3, 4, or 5			
1/4 in. air space	0.71	0.56	0.48
3/8 in. air space	0.65	0.52	0.42
1/2 in. and greater	0.63	0.50	0.40
Triple glass, argon filled			
1/4 in. argon space	0.72	0.57	0.49
3/8 in. argon space	0.69	0.55	0.46
1/2 in. and greater	0.68	0.53	0.44
Triple glass or double glass with polyester film suspended in between, low emissivity = 0.15 on surface 2, 3, 4, or 5			
1/4 in. argon space	0.65	0.52	0.42
3/8 in. argon space	0.62	0.48	0.39
1/2 in. and greater	0.61	0.47	0.38

* Note to Table 63.1019-3: An aluminum thermal break framed window shall incorporate the following minimum design characteristics:

- a. The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/hr/ft²/F°;
- b. The thermal break material shall not be less than 0.210 inches; and
- c. All metal framing members of the product to interior and exterior air must incorporate a thermal break meeting the criteria in a. and b. above.

(3) GROSS AREA OF ENVELOPE COMPONENTS. (a) *Roof assembly.* The gross area of a roof assembly consists of the total surface of the roof assembly exposed to outside air or unconditioned spaces. The roof assembly shall be considered to include all roof or ceiling components through which heat may flow between indoor and outdoor environments including skylight surfaces but excluding service openings. For thermal transmittance purposes when return air ceiling plenums are employed, the roof or ceiling assembly shall not include the resistance of the ceiling or the plenum space as part of the total resistance of the assembly.

(b) *Floor assembly.* The gross area of a floor assembly over outside or unconditioned spaces consists of the total surface of the floor assembly exposed to outside air or unconditioned space. The floor assembly shall include all floor components through which heat may flow between indoor and outdoor or unconditioned space environments.

(c) *Exterior walls.* The gross area of exterior walls enclosing a heated or cooled space is measured on the exterior and consists of the opaque wall including between floor spandrels, peripheral edges of flooring, window areas including sash, and door areas, but excluding vents, grilles, and pipes.

(4) SHADING COEFFICIENTS. The shading coefficient (SC_x) for fenestration shall be obtained from the ASHRAE Handbook of Fundamentals or from manufacturer's test data. SC_x is the shading coefficient of the fenestration including permanently installed internal and external shading devices but excluding the effect of external shading projections, which is calculated separately. The shading coefficient used for louvered shade screens shall be determined using a profile angle of 30° as found in the ASHRAE Handbook of Fundamentals.

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Part 4 Equipment and Systems

Comm 63.1020 Minimum equipment efficiencies. (1) Space heating or cooling equipment that is not covered by 10 CFR Part 430, Energy Conservation Program for Consumer Products, shall have a minimum efficiency at the specified rating conditions not less than the values given in ASHRAE 90.1, section 10.4.1.

(2) Equipment ratings shall be certified under a nationally recognized certification program or rating procedure or data furnished by the equipment manufacturer to show compliance with the minimum efficiency requirements.

Note: The following certification programs are accepted by the department: Gas Appliance and Manufacturers Association (GAMA) and Air-Conditioning and Refrigeration Institute (ARI).

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(3) Compliance with minimum efficiency requirements specified for HVAC equipment shall include compliance with part-load requirements where indicated as well as standards for full-load requirements. The part-load efficiency shall be determined as specified in ASHRAE 90.1.

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(4) Space heating or cooling equipment ^{just} used to provide additional functions, such as water heating for plumbing, ~~as part of a combination or integrated system~~ shall comply with minimum performance requirements for the appropriate space heating or cooling equipment category.

(5) Equipment providing water heating for plumbing that is used to provide additional functions, such as space heating, as part of a combination or integrated system shall comply with minimum performance requirements for water heating equipment as specified in s. Comm 84.20 (5) (n).

(6) Combination space and plumbing water heating equipment shall comply with IECC section 504.2.2.

Note: See ch. Comm 64 for additional requirements for combined systems.

(7) Equipment that is not used for comfort cooling or comfort heating is exempt from the energy efficiency requirements of this chapter.

Note: Omission of minimum performance requirements for certain classes of HVAC equipment does not preclude use of that equipment.

Comm 63.1021 Field-assembled equipment and components. When components, such as indoor or outdoor coils are used ~~from more than one manufacturer~~ as parts of air-conditioning or heating equipment, component efficiencies shall be specified based on data provided by the component manufacturers.

Comm 63.1022 Heat pump equipment controls. Controls for heat pumps equipped with supplementary heaters that are installed in residential buildings shall comply with IECC section 503.3.2.3, and for controls for equipment installed in commercial buildings shall comply with IECC sections 803.2.3.1 and 803.2.3.2.

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Comm 63.1023 Load calculations for sizing. (1) CALCULATION PROCEDURES. Heating and cooling system design loads for the purpose of sizing systems and equipment shall be determined in accordance with the procedures described in the ASHRAE Handbook of Fundamentals, or a similar computation procedure approved by the department. For those design parameters addressed in subs. (2) to (6), the values specified shall be used.

Note: This section does not require the installation of cooling equipment.

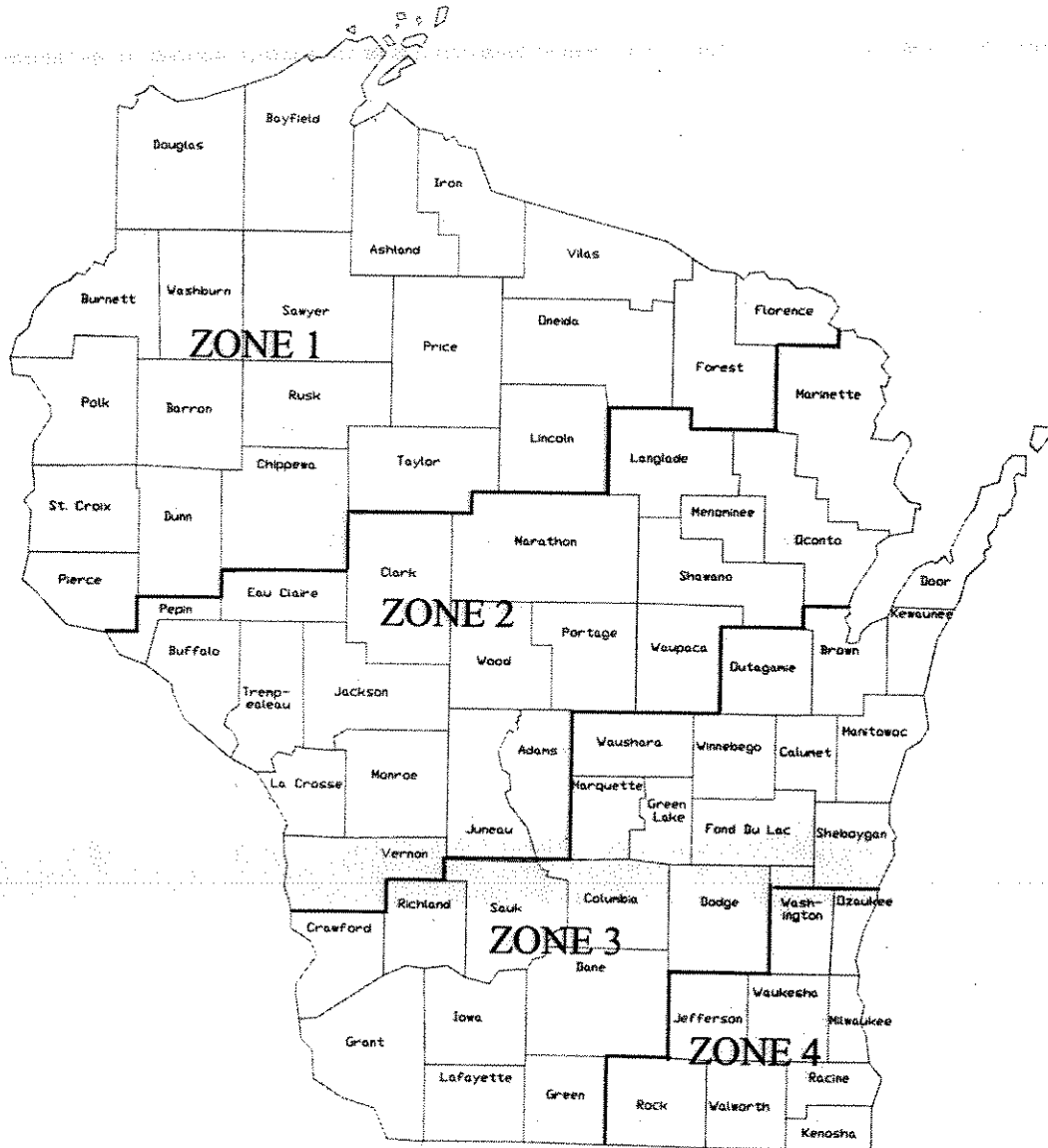
(2) INDOOR DESIGN CONDITIONS. The winter indoor design temperature is specified in Table 64.05. When air conditioning is provided in accordance with ch. Comm 64, the summer indoor design temperature is 78°F or lower.

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(3) OUTDOOR DESIGN CONDITIONS. Winter maximum and summer minimum for outdoor design temperatures shall be taken from Figure 63.1023.

Note: Systems may be designed for colder winter temperatures or for warmer summer temperatures.

Figure 63.1023
Outdoor Design Conditions



Zone	Winter	Summer	
	Design Temp. (°F)	Dry Bulb (°F)	Wet Bulb (°F)
1	-25	86	75*
2	-20	87	75
3	-15	87	75
4	-10	89	77

*Exception: For Douglas, Bayfield, Ashland and Iron Counties, use 70°F summer wet bulb design temperature.